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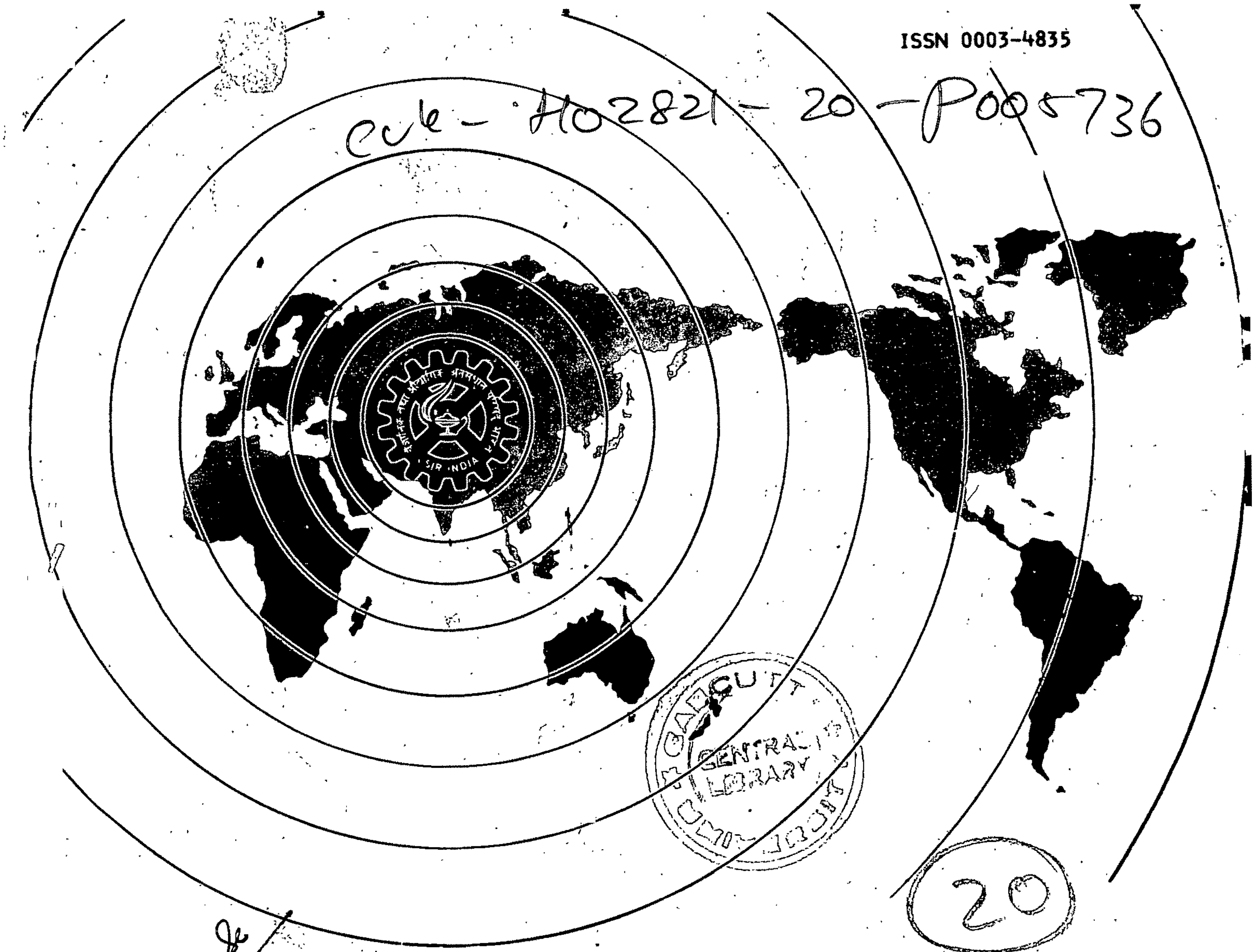

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DUPLICATION OF PERIODICALS IN SELECTED LIBRARIES OF HYDERABAD – AN ANALYSIS

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Paper analyses the duplication of periodical titles subscribed in Hyderabad, with the help of the 'Union List of Current Serials in Hyderabad 1989'. The duplication is analysed for Hyderabad by subject and geographical location. The duplication of periodicals costing more than Rs.10,000 is also analysed amongst selected libraries. Sets out the reasons to subscribe a periodical and suggests the creation of a nodal agency for effective co-operation amongst the libraries.

INTRODUCTION

The information explosion, the increase in the number of periodicals and specialisations, the rise in the costs of printing and distribution, the constant growth in the exchange rates and inflation, and the shrinking library budgets are putting a lot of hinderance in providing the required information to the users. In the event of such crisis inter-library co-operation in a thoughtful and purposeful manner is the only solution.

In this direction an attempt is made in the form of "Union List of Current Serials in Hyderabad 1989" (1) by the Indira Gandhi Memorial Library of University of Hyderabad. This compilation provides information on 5642 periodicals procured by 30 selected libraries of Hyderabad. The periodicals cover all disciplines of sciences, engineering, humanities, and social sciences. The data are available in machine readable form to facilitate easy addition, deletion and modification to the titles and library holdings. It is also possible to extend the scope of the Union list to cover more libraries interested in inter library co-operation.

The study brings out the extent of duplication in the serial receipts of the libraries and explores the ways and means for reducing the duplication.

DUPLICATION OF PERIODICALS

Out of the subscribed 5642 periodical titles, 1682 periodicals are received in more than one library. In other words about 30% of the journals received in any library are also available in some or the other library of Hyderabad. Table 1 shows the number of periodicals being subscribed by more than one library and the percentage of duplication.

The Union List covers 30 libraries pertaining to various disciplines. On an average, there are only 5 to 6 libraries belonging to a subject area. In addition to a number of specialised institutional libraries like those of NGRI, NIMH, Police Academy etc., are included in the list, whereas some significant libraries in the same subject like those of GSI/SR, GSI/AP, AMSE, MEC, NRSA, Survey of India, Gandhi Medical College, Osmania Medical College, History of Medicine, etc., which increase the rate of duplication of journals, are not included. Though the analysis shows only 30% of duplication in the journal subscription it would be much higher in factual terms. If the scope of the Union List be increased on the above lines, the duplication of journals would easily cross 40%. In other words, every

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Table 1

Extent of Duplication

No. of Periodicals	Percentage in Total	No. of libraries subcribing
3960	70.18	1
929	16.46	2
385	6.82	3
159	2.81	4
96	1.72	5
34	0.60	6
26	0.46	7
17	0.30	8.
36	0.63	9 and above
Total 5642	99.98	

second title subscribed to by any library is duplicated some where or the other within the city. A list of the periodicals duplicated is available with the authors for ready reference.

SUBJECT DISTRIBUTION

It would be interesting to know the extent of duplication between a few selected libraries serving the same subject area. Location wise they may be at a considerable distant, but due to high subject similarities the users usually move from one place to another within the same city to get relevant information. Hence tapping the resources of similar libraries is not a difficult task. Table 2 shows the groups of libraries serving the same subject area and the extent of duplication amongst them.

A similar grouping of libraries of the twin cities has been attempted by Subba Rao, S. and others (2). The present study, however, does not cover libraries of geological and defence sciences groups due to non-availability of complete data. Further, the study clubs all the academic libraries in sciences and humanities group of the most significant Osamania University and University of Hyderabad. This combination of both libraries would seem to affect the results of duplication, but the removal of these libraries does not show any significant variations.

Among five groups, the engineering group consisting of 7 libraries subscribes to a total of 1659 periodicals, but in actual terms, only 1176 distinct titles are subscribed to which results in 325 (i.e., 28%) duplicate periodicals. Most probably every fourth journal, subscribed in any of these 7 engineering libraries is also available in at least one other engineering library. The minimum range of duplication occurred in sciences is about 17%, in agriculture and humanities 18%. But as far as costs are concerned most probably science libraries would be wasting their resources to the maximum extent in duplication of periodicals. As already explained, the extent of duplication is only indicative of wasted resources and it would probably be higher than the duplication shown in the analysis, as some libraries with similar subject interests were left out. The total duplication of periodicals is about 30%, but the average duplication level in a given subject group is much less, except for engineering group libraries. This indicator also shows the diversity of the libraries and most probably the libraries covered cannot be distinguished as belonging to

Table 2

Subject Groupings and Duplication

Subject	*Codes of Libraries*	*No. of Libraries*	*Total No. of Periodicals*	*Distinct titles*	*Duplication*	*Percentage*
Agriculture	AAU, ACR, AIC, ANA	4	1409	1141	206	18
Engineering	EBH, ECE, EDE, EHA, EHM, ERD, TID	7	1659	1176	325	28
Sciences	SSR, UHU, UOS, MNI	4	2661	2177	376	17
Humanities	UTU, UCE, UOS, UHU, SAS	5	2851	2290	416	18
Social Sciences	SAS, SCE, SFC, SIC, SNI, SSV, GBL, IRD, UOS, UHU	10	3289	2451	528	22

a given subject group. The codes of libraries are taken basically from the INSDOC Union Catalog of Periodicals leaving the first three digits, which indicate the place, Hyderabad. Appendix 3 lists all the codes and libraries.

GEOGRAPHIC DISTRIBUTION

Hyderabad being a large city, it is also necessary to see the cite distribution of the libraries covered and the extent of duplication amongst them. A schematic diagram of twin cities of Hyderabad and Secunderabad with the location of libraries is provided in figure 1. Reasonably the total geographic area of Hyderabad can be divided into six major sectors. Table 3 shows the distribution of the libraries covered and the extent of duplication among them.

In 6th Sector, 10 libraries are included making the total number of subscribeed periodicals 12 3610, whereas the distinct periodicals being subscribed by this group are only 2934. The number of journals being duplicated is also high. 503, i.e. 17%. This means almost every fifth journal subscribed by any of the Osmania University area libraries is also available elesewhere within 3 kilometers range. The only library far away is Nuclear Fuel Complex, but the number of journals being subscribed by them is not very significant and good transportation services are available to reach these places. The Sector 3, with only 3 libraries, subscribes to 456 periodicals and out of them only 20 i.e., 5% are duplicated. The number is low because of non-inclusion of many libraries around this area like Midhani, BDL, DRDL, DRDO etc. In Sector 2 and Sector 6, that is Agriculture University and Osmania University areas, respectively, there is a duplication of about 16% to 17%. Initiation of efforts to minimise the duplication level would be advisable. It is not the intention that the libraries loose their budgets for periodical subscription but they can subscribe to more useful and

Table 3

Geographic Distribution of Libraries and Duplication

Sector	*Codes of Libraries*	*No. of Libraries*	*Total No. Periodicals*	*Distinct titles*	*Duplication*	*Percentage*
1	UHU, AIC, EBH, IRD	4	2263	2184	153	7
2	AAU, ANA, SNI, SSV	4	1343	1128	183	16
3	ACR, EDE, TDM	3	456	434	20	5
4	ERD, EHA, EHM, TID, MMH	5	900	770	100	13
5	UOP, GBL, SCE, SFC	4	400	360	36	10
6	UOS, UTU, UCE, GNG, MNI, SRR, SAS, SIC, ECE, TNC	10	3610	2934	503	17

distinct titles if some fruitful co-operation measures are adopted.

DUPLICATION BETWEEN SELECTED LIBRARIES

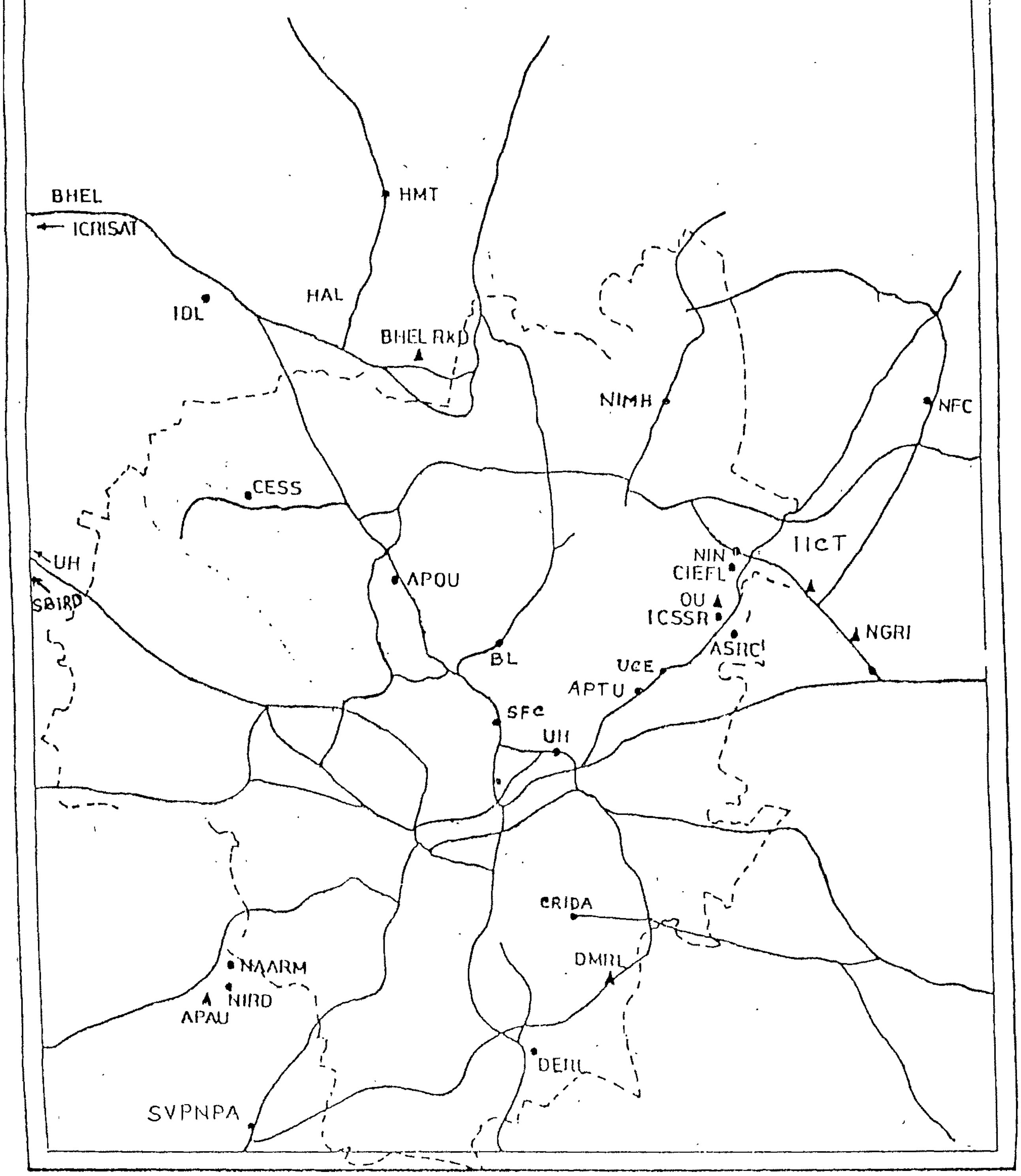
An attempt is made to analyse the duplication level between University of Hyderabad and some selected libraries of Hyderabad. The duplication of subscriptions between University of Hyderabad and Osaminia University (both academis) is for 170 periodical titles i.e. 19%. The duplication level between ASRC and University of Hyderabad (both social sciences and humanities) is 120 periodical titles i.e. 8%. The common periodicals between IICT and University of Hyderabad (both sciences) are 144 i.e. 10%. Similar duplication study could be made for any two libraries covered in the Union List and lists of periodicals common to them could be generated.

COST OF DUPLICATION

Hitherto, the attempt has been to quantify the number of duplicate periodical titles being subscribed amongst the libraries covered. It is useful to quantify the costs of duplication as far as possible. An effort to bring out a Union List of periodical holdings of costly journals, whose costs are more than Rs.5000, in Calcutta is being carried out by CALIBNET (3). However, the present study was limited to the analysis of costly periodicals, whose subscription was more than Rs. 10,000.00 (Rupees Ten Thousand). The latest prices available from University of Hyderabad, ICRISAT, IICT, CCMB, NIN, NIRD etc., are posted into the duplicate periodical lists, wherever the costs are found to be more than Rs. 10,000. Additionally, information about the rates of subscription was also obtained from Ulrich's International Periodicals Directory

Figure-1

MAJOR SELECTED LIBRARIES IN HYDERABAD & SECUNDERABAD



1988-89 for the costly journals. Appendix 1, lists 91 periodicals with individual annual subscription cost of more than Rs.10,000 that are duplicated in Hyderabad. The total cost of the single subscription for these periodicals would be Rs.20,55,975.98 and presently Hyderabad libraries are paying Rs.49,60,340.75 towards the subscription of these journals. That is 2½ (Two and half) times of the original) cost of the periodicals. Out of this list, 61 periodicals are duplicated between 2 libraries, 23 periodicals are duplicated among 3 libraries, 5 periodicals between 4 libraries, 1 periodical "Proceedings of the National Academy of Sciences of the United States of America" duplicated among 6 libraries. Out of the 91 periodicals only 6 titles belong to abstracting and indexing periodicals, which are duplicated.

Appendix 2 lists 124 periodical titles, whose costs are more than Rs.10,000 and are being subscribed by the University of Hyderabad for the year 1990 at a total cost of Rs.29,31,547.28.

It would be cost effective, if attention is concentrated on 91 periodicals which are duplicated. It is desirable to look into the content, scope, coverage, volume, need and use patterns of these periodicals more deeply. If the participating libraries could reduce the list even by five periodicals, they would be reducing their budgets by atleast Rs.60,000.00, which could be diverted for procuring other more useful journals.

REASONS FOR SUBSCRIPTION

It would be interesting to review why a periodical is subscribed in a given library. A random list of reasons both material and psychological is as follows :

1. The periodical being subscribed is very essential for the library.
2. Many specialised users work in the area.
3. Many users use the periodical.
4. It is a highly prestigious journal the availability of which will add to the stature of the library.
5. The user has sent his paper for duplication to the journal.
6. The user has published his papers in the journal.
7. The department has the additional budget from other sources.
8. There is nothing to subscribe, if this journal is dropped.
9. The user does not know the existence of another useful journal in the area.
10. The library with which the user was previously associated gets this journal.
11. The library has good backrun of the periodical and is committed to subscribe to it.
12. An important project is coming up in this area.
13. No other library could afford to subscribe the periodical in the area.
14. There is no other important journal in the field.
15. The user is associated with the publication board in the capacity of an editor, honarary editor, member etc.
16. The user is an important member of the learned society/association/research organisation which brings out the journal.
17. The journal is highly referred to in the recent literature on the subject.
18. The journal is indexed/abstracted in many secondary sources.

If libraries could compromise with some of these reasons for the list of journals provided there could certainly be more useful distribution of resources of the individual libraries.

CONCLUSIONS

There is a significant amount of duplication of periodical titles within Hyderabad and Secunderabad. A concerted effort of resource sharing would certainly make this city more resourceful in the number of subscribed periodicals. It may be useful to examine the creation of a nodal agency to channelise the reduction of duplication through mutual agreements and to provide information from these periodicals on priority, using all available modren communication, reproduction and distribution facilities. The responsibility to bring out an active information service regarding the contents of these journals, something similar to 'Current Contents of Costly Periodicals', with a provision to provide copies of the publications within a reasonable time, may also be assigned to the Agency. In this connection, the use of fascimile service (FAX) recently introduced in the city can also be examined.

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1. NagarajaRao K and Burhanuddin Md: Union list of current periodicals in Hyderabad 1989. Hyderabad, University of Hyderabad, 1989.

2. SubbaRao S, Divakar P and Ranga Raja Rao S: Resource sharing - a conceptual plan for Hyderabad. Paper presented at XI IASLIC National Seminar 26-29 Nov. 84, Hyderabad.

3. Availability of high-cost periodicals in S&T libraries in Calcutta: Study report. NISSAT Newsletter 1990, 9(1), 6-8.

APPENDIX – 1

Alphabetical List of Journals Being Duplicated Costing More Than Rs. 10,000

SNO	TITLE	PRICE IN Rs.	COMBINED PRICE
1	AGRICULTURAL AND FOREST METEOROLOGY ACR,AIC,ANA	10001.00	30003.00
2	AICHE JOURNAL ERD,SRR,	23905.00	47810.00
3	ANALYST MNI,SRR,TDM,TNC,	16136.00	64544.00
4	ANALYTICAL BIOCHEMISTRY UHU,MNI,SRR,	19992.96	59978.88
5	APPLIED PHYSICS LETTERS UHU,ERD,	14083.30	28166.60
6	ARCHIVES OF BIOCHEMISTRY AND BIOPHYSICS UHU,MNI,SRR,	19630.08	58890.24
7	ARCHIVES OF MICROBIOLOGY UHU,AIC,	25089.99	50179.98
8	ARTIFICIAL INTELLIGENCE (ELSEVIER) UHU,EDE,ERD.	14223.60	42670.80
9	BIOCHEMICA ET BIOPHYSICA ACTA UHU,SRR	83875.34	167750.68
10	BIOCHEMICAL AND BIOPHYSICAL RESEARCH COMMUNICATIONS UHU,MNI,SRR,	16139.52	48418.56
11	BIOCHEMICAL JOURNAL UHU,MNI,SRR,UOS,	17828.65	71314.60
12	BIOCHEMISTRY UHU,MNI,SRR,	16273.50	48820.50
13	BIOLOGICAL ABSTRACTS UHU,MNI,AAU,UOS,	108000.00	432000.00
14	CELLULAR IMMUNOLOGY UHU,SRR,	17288.64	34577.28
15	CHEMICAL ABSTRACTS WITH INDEX UHU,SRR,	207033.18	414066.36
16	CHEMICAL COMMUNICATIONS UHU,SRR,UOS,	10001.00	30003.00

DUPLICATION OF PERIODICALS

SNO	TITLE	PRICE IN Rs.	COMBINED PRICE
17	CHEMICAL ENGINEERING SCIENCE ERD,SRR,	17762.00	35524.00
18	CHEMISCHE BERICHTE UHU,SRR,	11840.62	23681.24
19	COMPUTERS AND CHEMICAL ENGINEERING ERD,SRR,	10165.00	20330.00
20	CURRENT ADVANCES IN PLANT SCIENCES UHU,AIC,	12280.80	24561.60
21	DEVELOPMENTAL BIOLOGY UHU,SRR,	19975.68	39951.36
22	ELECTRICAL AND ELECTRONICS ABSTRACTS EDE,ERD,	28400.00	56800.00
23	ENGINEERING FRACTURE MECHANICS ERD,TDM,	18000.00	36000.00
24	ENTOMOLOGY ABSTRACTS AIC,AAU,	10001.00	20002.00
25	EUROPEAN JOURNAL OF BIOCHEMISTRY UHU,SRR,	31864.67	63729.34
26	EXPERIENTIA MNI,SRR,	10001.00	20002.00
27	EXPERIMENTAL CELL RESEARCH UHU,SRR,	16588.80	33177.60
28	FARADAY TRANSACTIONS - SEC. I UHU,SRR,UOS,	16284.00	48852.00
29	FEBS LETTERS UHU,SRR,	34628.32	69256.64
30	FOOD SCIENCE AND TECHNOLOGY ABSTRACTS AIC,ANA,AAU,	17000.00	51000.00
31	FUEL ERD,SRR,	12980.00	25960.00
32	GENE UHU,SRR,	36138.48	72276.96
33	HISTORICAL ABSTRACTS - PART A MODERN HISTORY UHU,SAS,	17819.34	35638.68
34	INORGANIC CHEMISTRY UHU,SRR,UOS,	11991.00	35973.00

SNO	TITLE	PRICE IN Rs.	COMBINED PRICE
35	INTERNATIONAL JOURNAL OF BIOCHEMISTRY MNI,SRR,	12000.00	24000.00
36	INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES UHU,ERD,	16718.40	33436.80
37	INTERNATIONAL JOURNAL OF HEAT AND MASS TRANSFER ERD,SRR,TDM,	19046.00	57138.00
38	INTERNATIONAL JOURNAL OF PEPTIDE AND PROTEIN RESEARCH SRR,UOS,	10001.00	20002.00
39	INTERNATIONAL JOURNAL OF PRESSURE VESSELS AND PIPING EBH,ERD,	17838.30	35676.60
40	JOURNAL OF APPLIED PHYSICS UHU,EDE,GNG,ERD,SRR,TDM,	22199.10	133194.60
41	JOURNAL OF APPLIED POLYMER SCIENCE ERD,SRR,	26682.00	53364.00
42	JOURNAL OF BIOLOGICAL CHEMISTRY UHU,MNI,SRR,UOS,	11080.75	44323.00
43	JOURNAL OF CELL SCIENCE UHU,SRR,	12198.55	24397.10
44	JOURNAL OF CHEMICAL PHYSICS UHU,SRR,	33718.95	67437.90
45	JOURNAL OF FLUID MECHANICS UHU,ERD,	14067.90	28135.80
46	JOURNAL OF GENERAL MICROBIOLOGY UHU,AIC,SRR,UOS,	10001.00	40004.00
47	JOURNAL OF GENERAL VIROLOGY AIC,SRR,	10001.00	20002.00
48	JOURNAL OF HYDROLOGY AIC,GNG,	17000.00	34000.00
49	JOURNAL OF INSECT PHYSIOLOGY UHU,SRR,	21465.60	42931.20
50	JOURNAL OF MAGNETIC RESONANCE UHU,SRR,	16165.44	32330.88

DUPLICATION OF PERIODICALS

SNO	TITLE	PRICE IN Rs.	COMBINED PRICE
51	JOURNAL OF MAGNETISM AND MAGNETIC MATERIALS UHU,TDM,	29360.32	58720.64
52	JOURNAL OF MATERIALS SCIENCE UHU,ERD,TDM,	26044.50	78133.50
53	JOURNAL OF MATERIALS SCIENCE LETTERS UHU,TDM,	24225.00	48450.00
54	JOURNAL OF MOLECULAR BIOLOGY UHU,SRR,	25297.92	50595.84
55	JOURNAL OF NEUROCHEMISTRY UHU,MNI,SRR,	16071.45	48214.35
56	JOURNAL OF PHYSICAL CHEMISTRY UHU,SRR,	13995.21	27990.42
57	JOURNAL OF STEROID BIOCHEMISTRY UHU,SRR,	19711.20	39422.40
58	JOURNAL OF THE AMERICAN CHEMICAL SOCIETY UHU,SRR,UOS,	13549.83	40649.49
59	JOURNAL OF THE LESS COMMON METALS UHU,TDM,	37895.00	75790.00
60	LIFE SCIENCES UHU,MNI,SRR,	29515.20	88545.60
61	MATERIALS RESEARCH BULLETIN UHU,ERD,TDM,	10320.00	30960.00
62	MECHANISMS OF AGEING AND DEVELOPMENT UHU,SRR,	12386.80	24773.60
63	MOLECULAR AND CELLULAR BIOCHEMISTRY UHU,SRR	14560.00	29120.00
64	MOLECULAR AND CELLULAR ENDOCRINIOLOGY UHU,SRR	18649.40	37298.80
65	MOLECULAR AND GENERAL GENETICS UHU,SRR	32009.74	64019.48
66	NUCLEIC ACID RESEARCH UHU,SRR,	12975.00	25950.00
67	OPTICS COMMUNICATIONS UHU,EDE,	18596.04	37192.08

SNO	TITLE	PRICE IN Rs.	COMBINED PRICE
68	PATTERN RECOGNITION UHU,EDE,ERD,	10268.40	30805.20
69	PERKIN TRANSACTIONS - PART I UHU,SRR,UOS,	12000.00	36000.00
70	PERKIN TRANSACTIONS - PART II UHU,UOS,	13000.00	26000.00
71	PHYSICAL REVIEW - SEC. A GENERAL PHYSICS UHU,SRR,UOS,	21534.15	64602.45
72	PHYSICAL REVIEW - SEC. B CONDENSED MATTER UHU,SRR,UOS,	33994.50	101983.50
73	PHYSICAL REVIEW - SEC. D PARTICLES AND FIELDS UHU,SRR,UOS,	14964.50	44893.50
74	PHYSICAL REVIEW LETTERS UHU,SRR,	17408.05	34816.10
75	PHYSICS OF FLUIDS UHU,ERD,	15743.00	31486.00
76	PHYTOCHEMISTRY AIC,SRR,	15194.00	30388.00
77	PLANT AND SOIL AIC,AAU,ACR,	18000.00	54000.00
78	PLANTA UHU,AIC,	26181.13	52362.26
79	PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA UHU,AIC,MNI,SRR,UOS,	14000.00	70000.00
80	PSYCHOLOGICAL ABSTRACTS SNI,UOS,	16000.00	32000.00
81	SOCIAL SCIENCE AND MEDICINE UHU,MNI,	20433.60	40867.20
82	SOVIET ELECTRICAL ENGINEERING EBH,ERD,	10733.00	21466.00
83	SOVIET ENERGY TECHNOLOGY EBH,ERD,	10733.00	21466.00

DUPLICATION OF PERIODICALS

SNO	TITLE	PRICE IN Rs.	COMBINED PRICE
84	SPECTROCHIMICA ACTA - PART A MOLECULAR SPECTROSCOPY UHU,UOS,	13932.00	27864.00
85	SPECTROCHIMICA ACTA - PART B ATOMIC SPECTROSCOPY UHU,TDM,TNC,	14654.40	43963.20
86	TALANTA SRR,TDM,	12412.00	24824.00
87	TETRAHEDRON UHU,SRR,	59916.50	119833.00
88	TETRAHEDRON LETTERS UHU,SRR,	57792.00	115584.00
89	THEORETICAL AND APPLIED GENETICS UHU,AIC,	21192.68	42385.36
90	TOXICOLOGY AND APPLIED PHARMACOLOGY MNI,SRR,	10320.00	20640.00
91	VIROLOGY AIC,SRR,	17000.00	34000.00
	TOTAL	2055975.98	4960340.75

APPENDIX – 2

Alphabetical List of Journals Being Subscribed for the 1990 Costing More Than Rs. 10,000

SNO	TITLE	PRICE
1	ACTA MECHANICA	16872.62
2	ADVANCES IN MATHEMATICS	12528.00
3	ANALYTICAL BIOCHEMISTRY	19992.96
4	ANNALS OF PHYSICS	20373.12
5	APPLIED PHYSICS LETTERS	14083.30
6	ARCHIVES OF BIOCHEMISTRY AND BIOPHYSICS	19630.08
7	ARCHIVES OF MICROBIOLOGY	25089.99
8	ARTIFICIAL INTELLIGENCE (ELSEVIER)	14223.60
9	BIOCHEMICA ET BIOPHYSICA ACTA	83875.34
10	BIOCHEMICAL AND BIOPHYSICAL RESEARCH COMMUNICATIONS	16139.52
11	BIOCHEMICAL JOURNAL	17828.65
12	BIOCHEMISTRY	16273.50
13	BRAIN RESEARCH	100074.44
14	CELLULAR IMMUNOLOGY	17288.64
15	CHEMICAL ABSTRACTS WITH INDEXES	207033.18
16	CHEMICAL PHYSICS LETTERS	41529.40
17	CHEMISCHE BERICHTE	11840.62
18	CLASSICAL AND QUANTUM GRAVITY	11388.60
19	COORDINATION CHEMISTRY REVIEWS	19175.52
20	CURRENT ADVANCES IN PLANT SCIENCES	12280.80
21	DEVELOPMENTAL BIOLOGY	19975.68
22	DIFFERENTIAL EQUATIONS	18371.25
23	EURO PHYSICS LETTERS	13215.00

DUPLICATION OF PERIODICALS

SNO	TITLE	PRICE
24	EUROPEAN JOURNAL OF BIOCHEMISTRY	31864.67
25	EUROPEAN JOURNAL OF OPERATIONAL RESEARCH	14381.64
26	EXPERIMENTAL CELL RESEARCH	16588.80
27	FEBS LETTERS	34628.32
28	FEMS MICROBIOLOGY LETTERS	21985.12
29	FUNCTIONAL ANALYSIS AND ITS APPLICATIONS	13886.25
30	FUZZY SETS AND SYSTEMS	12423.70
31	GENE	36138.48
32	HISTORICAL ABSTRACTS - PART A (MODERN HISTORY)	17819.34
33	INFORMATION AND COMPUTATION	10350.72
34	INFORMATION PROCESSING LETTERS	11168.16
35	INORGANIC CHEMISTRY	11991.00
36	INORGANICA CHEMICA ACTA	41976.00
37	INSECT BIOCHEMISTRY	21465.60
38	INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES	16718.40
39	INTERNATIONAL JOURNAL OF QUANTUM CHEMISTRY	18061.20
40	INVENTIONES MATHEMATICAE	30346.33
41	JETP LETTERS	10985.50
42	JOURNAL OF ALGEBRA	18679.68
43	JOURNAL OF APPLIED PHYSICS	22199.10
44	JOURNAL OF BIOLOGICAL CHEMISTRY	11080.75
45	JOURNAL OF CELL SCIENCE	12198.55
46	JOURNAL OF CHEMICAL PHYSICS	33718.95
47	JOURNAL OF COMPUTATIONAL AND APPLIED MATHEMATICS	12204.20
48	JOURNAL OF DIFFERENTIAL EQUATIONS	13443.84

SNO	TITLE	PRICE
49	JOURNAL OF ECONOMETRICS	11193.60
50	JOURNAL OF FLUID MECHANICS	14067.90
51	JOURNAL OF FUNCTIONAL ANALYSIS	15534.72
52	JOURNAL OF LOW TEMPERATURE PHYSICS	15956.25
53	JOURNAL OF MAGNETIC RESONANCE	16165.44
54	JOURNAL OF MAGNETISM AND MAGNETIC MATERIALS	29360.32
55	JOURNAL OF MATHEMATICAL PHYSICS	15656.50
56	JOURNAL OF MOLECULAR BIOLOGY	25297.92
57	JOURNAL OF NEUROCHEMISTRY	16071.45
58	JOURNAL OF NEUROSCIENCE RESEARCH	18319.50
59	JOURNAL OF NON NEWTONIAN FLUID MECHANICS	11940.80
60	JOURNAL OF NON-CRYSTALLINE SOLIDS	32310.40
61	JOURNAL OF ORGANOMETALLIC CHEMISTRY	57542.10
62	JOURNAL OF PHOTOCHEMISTRY AND PHOTOBIOLOGY (SEC.B)	10494.00
63	JOURNAL OF PHYSICAL CHEMISTRY	13995.21
64	JOURNAL OF PHYSICS - CONDENSED MATTERS	33603.40
65	JOURNAL OF PHYSICS - SEC. A	17856.20
66	JOURNAL OF PHYSICS - SEC. B	15044.20
67	JOURNAL OF PHYSICS - SEC. G	10404.40
68	JOURNAL OF PHYSICS AND CHEMISTRY OF SOLIDS	17853.60
69	JOURNAL OF SOLID STATE CHEMISTRY	15534.72
70	JOURNAL OF STEROID BIOCHEMISTRY	19711.20
71	JOURNAL OF THE AMERICAN CHEMICAL SOCIETY	13549.83
72	JOURNAL OF THE LESS COMMON METALS	37895.00

DUPLICATION OF PERIODICALS

SNO	TITLE	PRICE
73	LIFE SCIENCES	29515.20
74	LIQUID CRYSTALS	14688.00
75	MATERIALS RESEARCH BULLETIN	10320.00
76	MATHEMATISCHE ZEITSCHRIFT	24093.19
77	MECHANISMS OF AGEING AND DEVELOPMENT	12386.80
78	MOLECULAR AND CELLULAR ENDOCRINOLOGY	18649.40
79	MOLECULAR AND GENERAL GENETICS	32009.74
80	MONATSCHEFTE FUER CHEMIE	10313.32
81	MUTATION RESEARCH	47412.00
82	NONLINEAR ANALYSIS	14448.00
83	NUCLEAR PHYSICS - SEC. B	77123.52
84	NUCLEIC ACID RESEARCH	12975.00
85	NUMERISCHE MATHEMATIK	15403.23
86	OPTICS COMMUNICATIONS	18596.04
87	PARALLEL COMPUTING	10202.36
88	PATTERN RECOGNITION	10268.40
89	PHILOSOPHICAL MAGAZINE - SEC. B	13392.00
90	PHYSICA - SEC. A	27103.86
91	PHYSICA - SEC. C	30115.40
92	PHYSICA - SEC. D	18069.24
93	PHYSICAL REVIEW - PART A	21534.15
94	PHYSICAL REVIEW - PART B	33994.50
95	PHYSICAL REVIEW - PART D	14964.50
96	PHYSICAL REVIEW LETTERS	17408.05
97	PHYSICS LETTERS - A & B	91452.48
98	PHYSICS OF FLUIDS - PART A	15743.00
99	PLANT SCIENCE	20344.80

SNO	TITLE	PRICE
100	PLANT SYSTEMATICS AND EVOLUTION	17567.71
101	PLANTA	26181.13
102	PLASMA PHYSICS AND CONTROLLED FUSION	11042.40
103	POLYHEDRON	24974.40
104	PROGRESS IN NEUROBIOLOGY	10113.60
105	PURE AND APPLIED CHEMISTRY	12362.70
106	SOCIAL SCIENCE AND MEDICINE	20433.60
107	SOLID STATE COMMUNICATIONS	23013.60
108	SOVIET JOURNAL OF LOW TEMPERATURE PHYSICS	14272.50
109	SOVIET PHYSICS (JETP)	22749.50
110	SOVIET PHYSICS (SEMICONDUCTORS)	21738.50
111	SOVIET PHYSICS (SOLID STATE)	23355.00
112	SOVIET PHYSICS (USPEKHI)	10899.00
113	SPECTROCHIMICA ACTA - PART A	13932.00
114	SPECTROCHIMICA ACTA - PART B	14654.40
115	SYNTHETIC COMMUNICATIONS	13157.69
116	TETRAHEDRON	59916.50
117	TETRAHEDRON LETTERS	57792.00
118	THEORETICA CHIMICA ACTA	13697.99
119	THEORETICAL AND APPLIED GENETICS	21192.68
120	THEORETICAL COMPUTER SCIENCE	17068.32
121	TRANSACTIONS OF THE AMERICAN MATHEMATICAL SOCIETY	12969.24
122	ZEITSCHRIFT FUER PHYSIK - PART A	16764.93
123	ZEITSCHRIFT FUER PHYSIK - PART B	27457.39
124	ZEITSCHRIFT FUER PHYSIK - PART C	30967.55
	TOTAL	2931547.28

APPENDIX – 3

Library Codes and Libraries

AAU – Andhra Pradesh Agricultural University
ACR – Central Research Institute for Dryland Agriculture
AIC – International Crops Research Institute for the Semi-Arid Tropics
ANA – National Academy for Agricultural Research Management
EBH – Bharat Heavy Electricals Limited, Ramachandrapuram
ECE – University College of Engineering, Osmania University
EDE – Defence Electronics Research Laboratory
EHA – Hindustan Aeronautics Limited
EHM – Hindustan Machine Tools Limited
ERD – Bharat Heavy Electricals Limited, Research and Development Division
GBL – British Library
GNG – National Geophysical Research Institute
IRD – State Bank Institute of Rural Development
MNI – National Institute of Nutrition
NMH – National Institute for Mentally Handicapped
SAS – American Studies Research Centre
SCE – Centre for Economic and Social Studies
SFC – Andhra Pradesh State Financial Corporation
SIC – Indian Council of Social Science Research, Southern Regional Centre
SNI – National Institute of Rural Development
SRR – Indian Institute of Chemical Technology
SSV – Sardar Vallabhbhai Patel National Police Academy
TDM – Defence Metallurgical Research Laboratory
TID – IDL Chemical Limited
TNC – Nuclear Fuel Complex
UCE – Central Institute of English and Foreign Languages
UHU – University of Hyderabad
UOP – Andhra Pradesh Open University
UOS – Osmania University
UTU – Andhra Pradesh Telugu University

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TOWARDS CREATION OF A NATIONAL DATABASE ON SCIENCE AND TECHNOLOGY

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The computerisation of Indian Science Abstracts has been described, which will reduce the processing time and help bring out the final output on target. It is contemplated to create a machine readable searchable, national database of Indian scientific and technical literature.

INTRODUCTION

Document analysis makes a significant contribution to communication and information flow. There are two major document analysis tools – Abstracts and Indexes. The Abstract is a vital link between the originator of information and its ultimate user. An abstracting service organises the literature so that a specialist can identify documents of his interest more easily, and it has been recognised as an important tool in science and technology which has contributed enormously to overall enrichment of knowledge for future use and development. In the recent past, the information on literature–search has increased tremendously. Handling of information is becoming more and more difficult due to lack of manpower and also change in the information scene. Information should be communicated to the user community as quickly as possible in the context of changed environment.

The information handling & dispensing environment in our country continues to change and new technologies are becoming more pervasive in the information field. The library and information personnel in the country are increasingly called upon to develop various types of tools in relation to the use and application of computers and other new information technologies. Some of these are developing information storage and retrieval systems of specialised data and material, managing different types of house-keeping operation, carrying out online searches for information users, using modern equipment, exchanging local databases and sharing of resources through networking and so on.

At present there is no comprehensive national database of Indian scientific and technical literature with necessary detailed information. It is felt that only Indian Science Abstracts (ISA) can fulfill the above requirements for creating a national database.

OVERVIEW OF INDIAN SCIENCE ABSTRACTS

Indian Science Abstracts was started by Indian National Scientific Documentation Centre (INSDOC) in January 1965 to abstract comprehensively and expeditiously the Indian scientific and technical literature. Original research articles including short communications, review and informative articles published in scientific and technical periodicals or in the proceedings of conferences and symposia, monographs and other ad-hoc publications as well as patents, standards, these and reports are notified therein. The entries are arranged in a broadly classified order according to Universal Decimal Classification (UDC) and each issue carries author and keyword indexes also. It thus constitutes a very comprehensive record of the output of the Indian scientific documents reported in about 800 learned periodicals on science and technology of Indian origin and of those reported by Indian scientists in foreign publications or of those which are published in any other form. Thus, ISA can also serve as an effective feeder service to international abstracting services.

For a long time, it is being felt to reduce the time lag between the publication of literature and its communication to the users in the form of a secondary sources material. With this objective it was decided that from 1990 onwards the ISA will be brought out with the help of computers. This will serve the dual purpose of creating a permanent national database of Indian scientific and technical literature as well as increasing the efficiency by way of bringing out the publication on time.

SELECTION OF SOFTWARE

Number of existing DBMS packages, some with 3GL interfaces, were considered. After considerable experimentation during designing stage it was felt that CDS/ISIS (Computerised Documentation Services/Integrated Set of Information System) package (version 2.3), which is having a Pascal interface, is the appropriate package for the purpose. Basically CDS/ISIS is a generalised information storage and retrieval software for the management of structured textual databases. It can be used to design integrated databases on specialised subjects. The package has already been used all over the world to design databases for a wide range of applications.

In CDS/ISIS search is based on boolean algebra which provides a convenient way of expressing logical operations between classes. Each search term associated with a given record, infact, can be viewed as representing the class of all those records associated with that term. Thus by expressing logical operations between search terms, the class of records could be retrieved in response to the requirement.

CDS/ISIS offers tremendous potential for the provision of value added, user oriented information services in libraries and information centres. Although it is written in assembly language, there is PASCAL programming facility for further manipulation such as FXT (free text searching), thesaurus maintenance, and defining of display format. There are also possibilities for interfacing CDS/ISIS with other mini and mainframe environments in networking arrangements.

While experimenting for the search of suitable package, the following short-coming have been observed in dBase in comparison to the CDS/ISIS package.

(i) repeatable field structure facility is not available in dBase package;

(ii) in dBase package memo field can not be extracted;

(iii) index for separate field can only be brought out separately at a time whereas combined index can be manipulated through CDS/ISIS package;

(iv) sub-fields and variable length fields are not supported in dBase; and

(v) dBase is not having any conversion programme to convert the data into ISO-2709 format, which is the de facto standard for exchange of information.

Creating a database using CDS/ISIS basically involves the following steps:

(i) data definition by creating an FDT (Field Definition Table), where tag, name, type and length of the field, subfield and their delimiters and data type are defined;

(ii) preparing the default worksheet for data entry;

(iii) establishing an FST (Field Select Table) specifying the indexing parameters of the inverted file for search purposes; and

(iv) specifying a display & print formats.

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COMPUTERIZATION OF ISA

Application Design and Data Structure

The information requirement is the first component of the application design. It is an interface between the analysis process and the design process. It leads to the specification of the design requirement for the pertinent part of information system to meet the requirement of the users. The design of Indian Science Abstracts database has been made using PC(XT/AT) and the publishing process through Xerox's VENTURA PUBLISHER software package.

The smallest unit of information is called field and the integrated set of field forms a record. One record of ISA database comprises 13 fields. The type and length of each field is variable. Some fields are also divided into subfields using different delimiters.

The ISA database consists of the following fields viz, author, affiliation, title, citation, patent, standard, theses, report, keyword, classification number, abstract, reference, and any additional information. (Appendix I for FDT).

PROCESSING PROCEDURE

The processing requirements may be grouped into three major categories:

(a) *Data input, verification and formatting:*

Data is input in the default worksheet and editing is normally done either during the input (to ensure that data is accurate, complete, and properly formatted for processing) or at the output stage. The 'editing' ensures that the transaction data conforms to that what is specified in the files and that data is to be processed according to UDC arrangement. Editing includes following procedures :

(i) inserting VENTURA codes for special symbols/characters;

(ii) checking whether proper delimiters are used before the inputting of subfields and also, if the display/print format is in the required form. (Appendix 2); and

(iii) determining the completeness of input data with all data elements for a given transaction.

Examination of all data elements is essential to determine the most practical and efficient means for manipulation.

A seven digit code replacing the classification number assigned to each entry has been evolved by way of retaining only the numerals represented in the classification number and ignoring all other characters/symbols. The conversion of classification number into a fixed digit code is done at the data input stage itself. For example^c6343639 is given in place of classification number^t634.36/39.

(b) *Data file maintenance:*

Data file maintenance involves deletions, addition and substitutions to an information file. Procedures for handling these transactions should be documented for appropriate data elements. If more than one PC is used for data input, the merging of all data in a single file should be done on routine basis for creation of a master file. The cycle period i.e. daily file checking, possible re-run or restart conditions, setup procedures, the sequence operations and processing safeguard such as the reasonability test should be applied to certain types of input; e.g. a field must be tested against use of delimiters.

(c) *Data retrieval:*

It is possible to extract required segments of information in CDS/ISIS. The Field Select Table (FST) (appendix 3) defines the criteria for extracting one or more elements from a master file record. Depending on the context in which an FST is being used, these elements may then be used to create an inverted file entries for the record from which they were extracted, for sorting records in the desired sequence before producing a printed report, or to reformal records during an import or export operation.

Preparing Text for Ventura

Text files used in ISA publication are prepared with CDS/ISIS package.

VENTURA is compatible with (READS & WRITES) text files but not necessarily, format codes of most popular wordprocessors such as WORDPERFECT, MS WORD, WORDSTAR, WINDOWS etc. It also supports ASCII-formatted files created by any type of software product, so we can import text from other wordprocessors, sidekick files, Lotus 1 2 3 spreadsheets, dBase files etc.

Inserting Special Symbols and Formating Codes

VENTURA puts its own formatting codes into the document automatically as we format it and we can also add the codes from the CDS/ISIS editor. The available codes are shown in Table 1.

Table 1

Attribute	Code
a) Change to bold face	<B>
b) Change to double underline	<=>
c) Change to italics	<I>
d) Change to lightweight	<L>
e) Change to medium weight	<M>
f) Change to subscript	<V>
g) Change to superscript	<^>

To use these, first enter the corresponding code from CDS/ISIS editor for the symbol we want. Then, use VENTURA'S TEXT mode (and set font) to set the font of that character to the symbol font set. While dealing with superscript and subscript the symbol (^) and (v) are used respectively. These characters are put in between F128D and F255M at the time of data input itself (appendix 4) and the codes must be enclosed in angular brackets. In case of special symbols the number of a particular symbol is put in between the same code and it must also be enclosed within angular brackets. VENTURA reads the text and converts all these codes to the same symbol or subscript/superscript.

On the other hand, this problem can also be sorted out by transferring the records into the WORDSTAR file using pt and pv for superscript and subscript respectively and the special symbols are also dealt with using numeric pad. The main problem of adapting this technique is that the most of the (low cost) dot matrix printers are not able to print above mentioned characters. Therefore, it necessitated the use of either VENTURA software package or the Laser printer.

The output DBMS file for CDS/ISIS is loaded to WS4 in the non-document mode in order that all the controls (viz, line format, page format, carriage return etc) are removed. Hence, the resulting file is further loaded to VENTURA in ASCII mode, thereby getting all the special characters in the VENTURA system software. The final output is printed through POSTSCRIPT Laser printer (appendix 5).

PROBLEMS ENCOUNTERED WHILE USING CDS/ISIS

Indian Science Abstracts covers all branches of science and a large number of special characters are to be dealt with in it. The CDS/ISIS is not capable of handling special characters such as mathematical notations, chemical formulae, Greek letters, subscripts and superscripts. This necessitated the use of VENTURA software package for conversion of above mentioned characters. This device solved the problems of publishing the periodical. But in a searchable database these codes can not function. Hence, attempts have to be made to tackle this problem before a machine readable/searchable database is created.

In CDS/ISIS, the preparation of keyword or author index, the serial/entry number is printed under the author or keyword (appendix

6). While taking the print out of author and keyword index, the CDS/ISIS package did not help in bringing out the result in the desired pattern, i.e. the corresponding serial number could not be printed at the required position. This problem of indexing deficiency was solved in CDS/ISIS package itself by developing a programme in PASCAL language (appendix 7).

CONCLUSION

Computerisation of Indian Science Abstracts will not only help to create a comprehensive national database of Indian scientific and technical literature but will also help us to reduce processing time considerably for maintaining the strict time schedule without wasting time on composition etc., as followed in conventional method of publishing.

ACKNOWLEDGEMENTS

We are grateful to Prof. T. Viswanathan, Director, INSDOC, New Delhi for his consistant encouragement and guidance in execution of this project. Our sincere thanks are due to Shri A.S. Rao, Documentation Officer, NSL, New Delhi for his valuable suggestions.

REFERENCES

1. Mathur R: dBase III plus for beginner. 1989, Galgotia, New Delhi, 478.
2. MINI-MICRO CDS/ISIS 2.3 Reference Manual & CDS/ISIS PASCAL Manual. UNESCO. 1989.
3. VENTURA Manual.

APPENDIX 1

Field Definition Table

Tag	Name	Length	Type	Rep	Delimiters/pattern
10	AUTHOR	250	X	R	pc
20	AFFILIATION	200	X		dip
30	TITLE OF PAPER	300	X		jpstr
40	CITATION	200	X		tyvp
50	PATENT	50	X		cn
60	STANDARD	100	X		
70	THESIS	100	X		ipy
80	REPORT	100	X		pnyg
90	KEYWORDS	300	X	R	
100	CLASS NO.	100	X		mstc
110	ABSTRACT	1500	X		
120	ADD.INFORMATION	50	X		acis
140	REFERENCES	15	X		

APPENDIX 2

Print/ Display Format

```
c8,mnu,v100^m,v100^s,v100^t##/c8,"PATENT"d50,"STANDARD"d60,
"THESIS"d70,"REPORT"d80##/ mfn(5),x1,v10^p+|,|,v10^c, mhl,
 "("d20,v20^d", ",v20^i", ",v20^p,")" d20,'; ', v30^j".",
v30^p". ",v30^s". ",v30^t". ",v30^r".",v40^t," "v40^y,
", ",v40^v",",v40^p".",v50^c,x1," : ",v50^n".", if p(v120)
then " ("d120,v120^a,v120^c,v120^i,v120^s,if a(v110) and
p(v140) then "; " else ")"d120 fi else if a(v110) then
v140 fi fi/## v110,if p(v110)and a(v120) then " "v140"." fi
```

APPENDIX 3

Field Select Table

ID	IT	Data Extraction Format
10	0	(v10^p/),(v10^c/)
30	1	v30
40	0	v40^t
41	0	v40^y
42	0	v40^v
70	1	v70
80	0	v80^p
81	0	v80^n
82	0	v80^y
90	2	(v90/)
100	0	v100^m
101	0	v100^s
102	0	v100^t

APPENDIX 4

Sample Entry in WORDSTAR for VENTURA

```
00053

PADMANABHAN  V  M, YADAVA V S, RAMESH CHANDRA,  POONIA  N  S
(Neut Phy Div, BARC, Bombay 400085): Structure of bis (2,2'-
bipyridyl)bis(2,4,6-trinitrophenolato)-calcium(II) [Ca(C<v>10
<F128D><F255M>N<v>2<F128D><F255M>H<v>8)<v>2<F128D><F255M>(C<v>
6<F128D><F255M>N<v>3<F128D><F255M>O<v>7<F128D><F255M>H<v>2<F12
8D><F255M>)<v>2<F128D><F255M>]. Curr Sci 1989, 58(20), 1125-30.

[Ca(C<v>10<F128D><F255M>N<v>2<F128D><F255M>H<v>8<F128D><F255M>
)<v>2<F128D><F255M>(C<v>6<F128D><F255M>N<v>3<F128D><F255>O<v>7
<F128D><F255M>H<v>2<F128D><F255M>)<v>2<F128D><F255M>],M<v><F12
8D><103><F255M>= 808.7, m.p.= 488-498 K, orthjorhombic Pbca,
a = 24.154(5), b = 16.128(5), c = 18.068(6) <143>, v = 7038.5
<143> Z = 8, D<v>c<F128D><F255M>= 1.528, D<v>m =  1.532 g cm
(flotation) <F128D><108><F255M>(MoK<v><F128D><97><F255M><F128D>
<F255M> =  0.7107 <143> Zr filter,<F128D><109><F255M> = 2.53 cm
<^>-1<F128D><F255M>, F(000) =3312, room temperature, R=0.068
for  1263 reflections. Calcium is eight coordinated  to  the
four  N  atoms of 2,2'-bipyridine(bipy) and to  the  four  O
atoms  belonging  to the two  trinitrophenolates(tnp)  in  a
distorted  square  antiprism geometry. In  the  coordination
polyhedra  distances  between Ca and phenolic  O  atoms  are
shorter  than  the other Ca-O and Ca-N bond  distances.  The
nitro  groups are rotated out of the ring planes  of  tnp.In
both  bipy  molecules  the  rings  are  in  the  twisted
conformation.
```

APPENDIX 5

Final Output From VENTURA

00053 PADMANABHAN V M, YADAVA V S, RAMESH CHANDRA, POONIA N S (Neut Phy Div, BARC, Bombay 400085): Structure of bis (2,2'-bipyridyl)bis(2,4,6-trinitrophenolato)-calcium(II) $[Ca(C_{10}N_2H_8)_2\ (C_6N_3O_7H_2)_2]$. Curr Sci 1989, 58(20), 1125-30.

$[Ca(C_{10}N_2H_8)_2(C_6N_3O_7H_2)_2]$, M_γ= 808.7, m.p.= 488-498 K, orthjorhombic Pbca, a = 24.154(5), b = 16.128(5), c = 18.068(6) Å, v = 7038.5 Å Z = 8, D_c= 1.528, D_m = 1.532 g cm (flotation) λ(MoKα = 0.7107 Å Zr filter, μ = 2.53 cm^{-1}, F(000) =3312, room temperature, R=0.068 for 1263 reflections. Calcium is eight coordinated to the four N atoms of 2,2'-bipyridine(bipy) and to the four O atoms belonging to the two trinitrophenolates(tnp) in a distorted square antiprism geometry. In the coordination polyhedra distances between Ca and phenolic O atoms are shorter than the other Ca-O and Ca-N bond distances. The nitro groups are rotated out of the

APPENDIX 6

```
Index through CDS/ ISIS

          Abbas S

          000848

          Abd-Ellah I M

          000104

          Abdul Bari P A

          000626

          Abdulsalam M

          000747

          Abitha Devi N

          000827

          Acharya B C

          000146

          Acharya V N

          000456

          Acharyya S

          000436

          Achutham M

          000041

          Adhami S

          000387

          Adhikari M

          000694, 000695

          Adityachaudhury N

          000281
```

APPENDIX 7

```
Index using PASCAL Programme

Abbas S                  000848
Abd-Ellah I M            000104
Abdul Bari P A           000626
Abdulsalam M             000747
Abitha Devi N            000827
Acharya B C              000146
Acharya V N              000456
Acharyya S               000436
Achuthan M               000041
Adhami S                 000387
Adhikari M               000694,000695
Adityachaudhury N        000281
```

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ACQUISITION AND DISTRIBUTION OF PRIMARY AND SECONDARY SERIALS IN INFORMATION SCIENCE IN INDIA – AN ANALYTICAL STUDY

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An attempt has been made to analyze the acquisition and distribution pattern of current serials in the field of library and information science covered in the secondary periodicals "Library and Information Science Abstracts" and the "Library Literature" in the libraries located in different zones of the country and participating in the National Union Catalogue of Scientific Serials (NUCSSI) database. Each title is analyzed for its coverage in the university and other libraries in different zones. The study reveals that 37.2% of total titles of LISA and LL are available in the participating libraries.

INTRODUCTION

The National Union Catalogue of Scientific Serials in India (NUCSSI) has been brought out by the Indian National Scientific Documentation Centre (INSDOC) in machine-readable form. The NUCSSI database provides information about the availability of 35,000 serial titles through 2.6 lakhs holdings data of more than 800 libraries in India, out of which 18,000 serial titles are current.

In India there are about 52 universities and 2 institutes which are running courses in the field of Library and Information Science - either at graduate or at post-graduate level or both. The NUCSSI database has, however, included the holdings of 35 university libraries and 2 institute libraries attached to INSDOC at Delhi and DRTC at Bangalore. The National Science Library (NSL) of INSDOC, in addition to Indian serials, has built up a good collection of serials in foreign languages and serials with cover to cover translations in science and technology. The library has also got a rich collection of journals in library science and allied fields. An analysis has been made regarding the location of the university libraries in different zones and their coverage in NUCSSI database. There are 12 university libraries in the north zone, 13 in the west zone, 14 in the south zone, 5 in the central zone, 5 in the east zone and 1 in the north-east zone.

Table I

Zone-wise Break up of University Libraries

Zone	No. of univ. lib.	No. of univ. lib. covered in NUCSSI
North	12	5
West	13	9
South	14	12
Central	5	3
East	5	5
North-east	1	1

Comparative study, based on the NUCSSI database, of the acquisition of current serials in the field of library and information science by the participating libraries located in different zones i.e. North, West, South, Central, East, North-east and NSL has been done. The serial titles listed in the NUCSSI database are compared with the titles covered in the "Library

Literature" (LL) and the "Library and Information Science Abstracts" (LISA).

OBJECTIVES

The objectives of the study are:

1. To highlight the acquisition and distribution pattern of the serial titles abstracted/indexed in LISA and LL in NSL, university and other libraries in different zones; and to study the stronger and weaker areas of coverage.
2. To focus LL and LISA titles which are not covered in NUCSSI database, with respect to language, subject, scope and country of origin.
3. To determine the extent of coverage of Indian serial titles in LISA and LL.
4. To find out the availability of core titles in NSL, university and other libraries in different zones.
5. To suggest ways and means for acquiring serial titles published from different countries in other languages to fill the gap.
6. To study the distribution pattern of LL and LISA in NSL, university and other libraries in different zones.

METHODOLOGY

The serials covered in the Library Literature and the Library and Information Science Abstracts in 1987 have been taken and their availability and distribution in NSL, university and other libraries in different zones are studied on the basis of NUCSSI database.

LISA is published monthly by the Library Association, London. It offers international coverage of serials on Library Science, Documentation, Cybernetics, Information Theory, Information Science, Computers, Automation, Printing, Reprography, Patent, Management and Archives, etc. It covered 437 serial titles in 1987.

LL is published monthly by H.W. Wilson Company, a major producer of indexing services in the U.S. It includes news items and reviews that are not covered by the abstracting services. It covered about 204 serial titles in 1987.

ANALYSIS

Serial titles covered in LISA and LL are observed for their availability in various libraries and total number of copies in NSL, university and other libraries in different zones.

Number and Pecentage of Unique Titles

There are some serial titles which are indexed either by LISA or LL. Table I-A and I-B show the number of LISA and LL titles, percentage and total number of subscribers i.e. copies available in NSL, university and other libraries of each zone.

Out of 437 titles, 134 are subscribed by NSL, 47 by 87 university libraries and 76 titles by 331 other libraries in the North zone while only 3 titles are acquired by other libraries of north-east zone.

Out of 205 titles, 86 titles are available in NSL, 35 titles having 63 copies in university libraries and 48 titles having 187 copies in other libraries of north zone, while only 1 title is available in other library of north-east zone.

Thus the number of receipt titles covered either in LISA or LL is maximum in the libraries of north zone while minimum in library of north-east zone.

Core Journals

The journals indexed by both the services are considered as core journals. Table II shows the number of core journals, their percentage and the number of copies available in NSL, university and other libraries in different zones.

Out of 148 core journals, 75 are available in NSL, 33 having 60 copies in university libraries, and 42 having 179 copies in other libraries of north zone.

Table I-A

Distribution of LISA Titles (437)

	University Libraries			Other Libraries		
	No. of Titles	Percentage	No. Subscribed	No. of Titles	Percentage	No. Subscribed
NSL	134	30.66				
North	47	10.75	87	76	17.39	331
West	40	9.15	98	48	10.98	165
South	46	10.52	196	69	15.78	315
Central	14	3.20	21	6	1.37	8
East	33	7.55	55	71	16.24	243
North-east	-	-	-	3	0.68	4

Table I-B

Distribution of LL Titles (205)

	University Libraries			Other Libraries		
	No. of Titles	Percentage	No. Subscribed	No. of Titles	Percentage	No. Subscribed
NSL	86	41.95				
North	35	17.07	63	48	23.41	187
West	28	13.65	67	26	12.68	86
South	32	15.60	143	46	22.43	188
Central	9	4.39	11	3	1.46	3
East	24	11.70	36	50	24.39	137
North-east	-	-	-	1	0.48	1

Table II

Distribution of Core Journals (148)
(LL + LISA)

	University Libraries			Other Libraries		
	No. of Titles	Percentage	No. Subscribed	No. of Titles	Percentage	No. Subscribed
NSL	75	50.67				
North	33	22.29	60	42	28.37	179
West	26	17.56	64	25	16.89	85
South	29	19.59	132	43	29.05	183
Central	8	5.40	13	3	1.47	33
East	22	14.86	34	43	29.05	127
North-east	-	-	-	1	0.67	1

Coverage of Indian Titles

Coverage of Indian titles in LL, LISA and both is as shown in Table III.

Table III

Number and Percentage of Indian Titles Indexed in LL and LISA

1. Total No. of titles covered in LL = 205
2. Total No. of titles covered in LISA = 437
3. Common titles = 148.

	No. of Titles	Percentage	No. subscribed
LISA	10	2.28	508
LL	1	0.48	78
LL+LISA	1	0.67	78

Out of 437 LISA and 205 LL titles 10 and 1 are Indian titles having 508 and 78 subscribers in various zones respectively.

There are 27 Indian titles covered in NUCSSI database, out of which only 10 titles have been covered by LISA and 1 by LL.

Distribution of LL & LISA

Table-IV shows the distribution and total number of copies of LL and LISA in NSL, university and other libraries of different zones.

Table IV

Distribution of LL and LISA

	No. of Univ.	Total No. of copies			
		LL		LISA	
		Univ. Lib.	Other Lib.	Univ. Lib.	Other Lib.
NSL		1		1	
North	12	2	-	3	6
West	13	2	-	4	5
South	14	4	2	7	5
Central	5	-	-	1	-
East	5	1	1	2	11
North-east	1	-	-	-	-

Table VI

Subject, Language and Country-wise Break-up Non-Receipt LL £ LISA titles

Subject	No. of titles	Country							Language					
		USA	UK	Australia	Germany	Canada	Int.	+Others	English	German	French	Italian	Spanish	*Others
Library Science	229	70	35	14	18	9	6	77	160	17	5	4	4	39
Archives	17	2	2	1	2	1	3	6	8	2	1	-	1	5
Inf. Science	30	6	10	1	1	-	5	7	25	-	2	1	-	2
Automation	13	7	4	1	-	1	-	-	13	-	-	-	-	-
Documentation	15	8	-	1	-	1	-	5	10	-	1	-	-	4
Printing & Reprography	6	6	-	-	-	-	-	-	6	-	-	-	-	-
TOTAL :	310	99	51	18	21	12	14	95	222	19	9	5	5	50

Here others include (+) Countries like Nigeria, Netherlands, Norway, Poland, Switzerland, South Africa, Tanzania, Malaysia, Denmark, Sweden, Hungary, Spain, USSR etc.

(*) Languages like Danish, Swedish, Hungarian, Polish, Russian, Persian etc.

Title Overlap:

Overlapping means the indexing of a title by more than one service. Table-V shows the percentage between LL and LISA in NSL, University and other libraries of different zones. For this, Goldstain's formula has been used for calculating the percentage of overlap.

$$\text{Percentage of Overlap} = \frac{0}{(A+B)-0}$$

where 0 = Overlapping title count
A = Titles indexed in LISA
B = Titles indexed in LL

Table V

Amount and Percentage Overlap in 1987

	University Libraries		Other Libraries	
	Total No. of Titles	Percentage	Total No. of Titles	Percentage
NSL	75	13.22		
North	33	5.41	42	7.00
West	26	4.22	25	4.05
South	29	4.73	43	7.17
Central	8	1.26	3	0.46
East	22	3.54	43	7.17
North-east	-	-	1	0.15

Non-receipt Titles:

Non-receipt titles of LL and LISA have been analysed on the basis of language, subject scope and the country of origin. The detail is given in Table No.VI.

There are 310 titles of LL and LISA which are not available in NUCSSI database. Table-VII shows the non-receipt titles.

The percentage of non-receipt titles covered in LL+LISA is less as compared to percentage of non-receipt titles covered either by LISA or LL. Thus the percentage of non-receipt titles in NUCSSI Database - LISA+LL 36%, LISA 62%, and LL 46%.

Table VII

Non-receipt Titles in NUCSSI Database

	Total No. of Titles	Non-receipt Titles	Percentage
LISA	437	270	61.78
LL	205	94	45.85
LISA+LL	148	54	36.48

FINDING & CONCLUSION

a) The study reveals that the coverage of LISA titles in NUCSSI is 38%, LL - 54% and LL+LISA is 64%.

b) It is evident that NSL is having so for the best coverage of LISA titles (31%), LL (42%) and LL+LISA titles (51%) compared to many universities which are running training courses in the field of library and information science. NSL should endeavour to make the present collection more comprehensive covering atleast 54 non-receipt titles common to both LL and LISA in the first phase.

c) The libraries in north zone have better collection in comparison to libraries of other zones. Further, libraries other than the university libraries in different zones have built up good collection of serials covered in LISA, LL and LL+ LISA titles.

d) LL and LISA are the most important secondary sources for comprehensive literature search in the field of library and information science. The Table IV shows very poor coverage in University libraries of all regions. Each university library running training courses should have at least one copy of either LL or LISA, even though they lack primary serials in the library. The availability of LL and LISA is essential for students taking up research in the field of library and information science.

e) Very poor coverage of Indian titles in LISA and LL is indeed surprising. A separate study has to be taken up for those Indian serials which are not covered in LL and LISA to assess the quality of papers published in the serials.

f) Further studies are required to assess whether the overall coverage of serials at present in NSL and other libraries is adequate or not. This can be done by doing literature search in any field from LISA and LL and finding out the availability of primary serials. This will give indication to what extent primary serials are available in the country.

g) It is essential to effect rationalization in acquisition of serials which are being received in large number in the University and other libraries. Perhaps by saving the expenditure on duplication, it would be possible to acquire a large number of non-receipt titles.

ACKNOWLEDGEMENT

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CONTRIBUTION OF JOURNAL ARTICLES BY INDIAN LINGUISTS AT THE INTERNATIONAL SCENE

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The study analyses the articles abstracted in Linguistics and Language behaviour Abstracts (LLBA) Vol. 11 to 21, 1977-87 to identify the authorship pattern, topics covered in linguistics and related fields, geographical distribution of authors, chronological distribution, most preferred periodicals of linguists, etc. Brings to light the research output of the linguists of Indian origin through articles published in journals at the international level during the 10-year period, highlighting both the area of interest and the neglected areas in linguistics requiring study and development. Additionally, underlines the academic interest of the linguists and the journals most preferred by them for the benefit of the information scientist to enable them to fulfil the information needs of the concerned academic circles.

INTRODUCTION

Linguistics, the science that attempts to explain how a language works, has witnessed signicant growth in the recent past. Over the last forty years and especially since 1957, linguistic interest in abstract theories and mathematical models has increased substantially (Jones and Kay 1973). The course of development is evident in the Kaleidoscopic contents of the Linguistics and Language Behaviour Abstracts (LLBA), which in 1967 listed 21 topics without a clear-cut differentiation between main and subheadings. In 1987, LLBA listed 74 topics under 30 main headings. Linguistics is then in no more a primitive stage of development but is able to provide a firm basis for the kind of practical activity of interest to information scientists.

In this perspective, it is worthwhile to assess the contribution of Indian authors to the field of linguistics at the international level on the basis of journal articles. A study conducted on an India-based international journal revealed that the contribution from the authors from foreign countries were far less than those from the Indian authors (Sharda and Vani, 1987). This finding provided the needed impetus to review all facets of the research scene. Therefore, an analysis of the contributions of the Indian authors at the international level was undertaken.

Research is a prerequiste for any discipline to grow. It is, therefore, essential to examine the role of Indian authors in promoting the research in the field of linguistics. Such an assessment is expected to identify and initiate research in fallow areas and also guide the future development of linguistics.

OBJECTIVES

The objectives of the study were as follows:

1. To examine through journal articles the contributions of Indian authors to linguistics at the international level.
2. To identify the authorship pattern; subjects; geographical, language and year-wise dispersion of the articles; and the most preferred journals.

MATERIALS

In order to meet the twin objectives, an abstract was considered to be the most appropriate source for data collection. Though the abstract is only a secondary source of information, it is selected for the present study because of the easy accessibility and availability of several journal articles at a time in an abstracting service.

"Linguistics and Language Behaviour Abstracts" (LLBA) is a quarterly publication published by the Sociological Abstracts, Inc., New York. It reflects the world literature in language behaviour, linguistics and releated fields as it regularly monitors 632 journals. The articles are classified into 74 subtopics under 30 main subject headings. The same scheme of classification is adopted for the present study.

Eleven volumes, i.e., Vol. 11 to 21, 1977-87 of LLBA were selected for the study excepting two issues, i.e., 1977 (No. 2) and 1979 (No. 3) which were not available at the time of data collection. Out of 75077 articles abstracted in LLBA, only 1.33% (i.e., 1000 articles) were from authors of Indian origin. Excluding the book reviews and review articles, on the whole 808 articles were considered for the analysis.

METHODOLOGY

The author index of each issue of LLBA was scanned and the names of the Indian authors were identified on the basis of their Indic origin. In case of confusion regarding the nationality of authors the abstracts were also scrutinized for reference to Indian languages. All the bibliographical information pertaining to Indian contributions was recorded on slips. In addition, the subject headings were also noted to facilitate subject-wise analysis. The information thus collected was analysed for frequency count for the qualitative and quantitative analysis, as specified in the objectives.

ANALYSIS

With the ten-years data of LLBA, 808 articles came under the purview of the analysis. Unlike citation analysis which reveals the most cited author, most frequently cited periodicals, etc., the present study brings to light the most prolific author, most preferred journal, etc.

Authorship Pattern

Out of the total 808 articles, 45% were contributed by Indians residing abroad. Contributions from female researchers were 173. Two areas of authorship pattern have been discussed here.

1. Research coordination or multiple-authorship; and
2. Author productivity

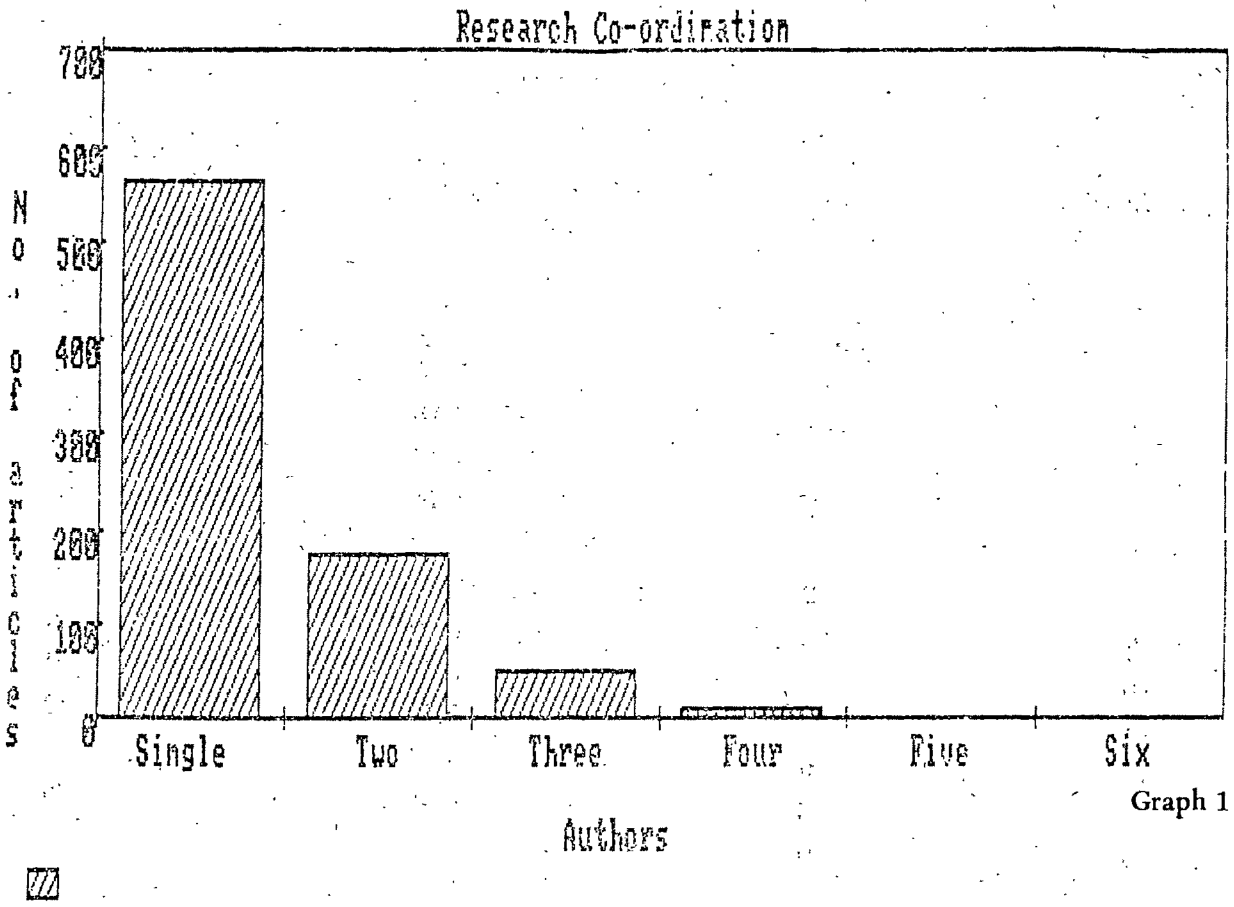
Research Co-ordination Pattern

Graph no. 1 presents the research coordination pattern and reveals that the solo research dominates the research coordination. Out of 242 multiple author articles, collaboration between Indian authors (167 articles) exceeds the same between Indian and Foreign authors (75) out of which 25 are foreign female authors. The latter gains significance by its very prevalence. Contributions from 5 (3 articles) and six and more (2 articles) are too small for the computer to take into account while preparing the graph. Though solo research dominates, coordinated research is in the developing stage.

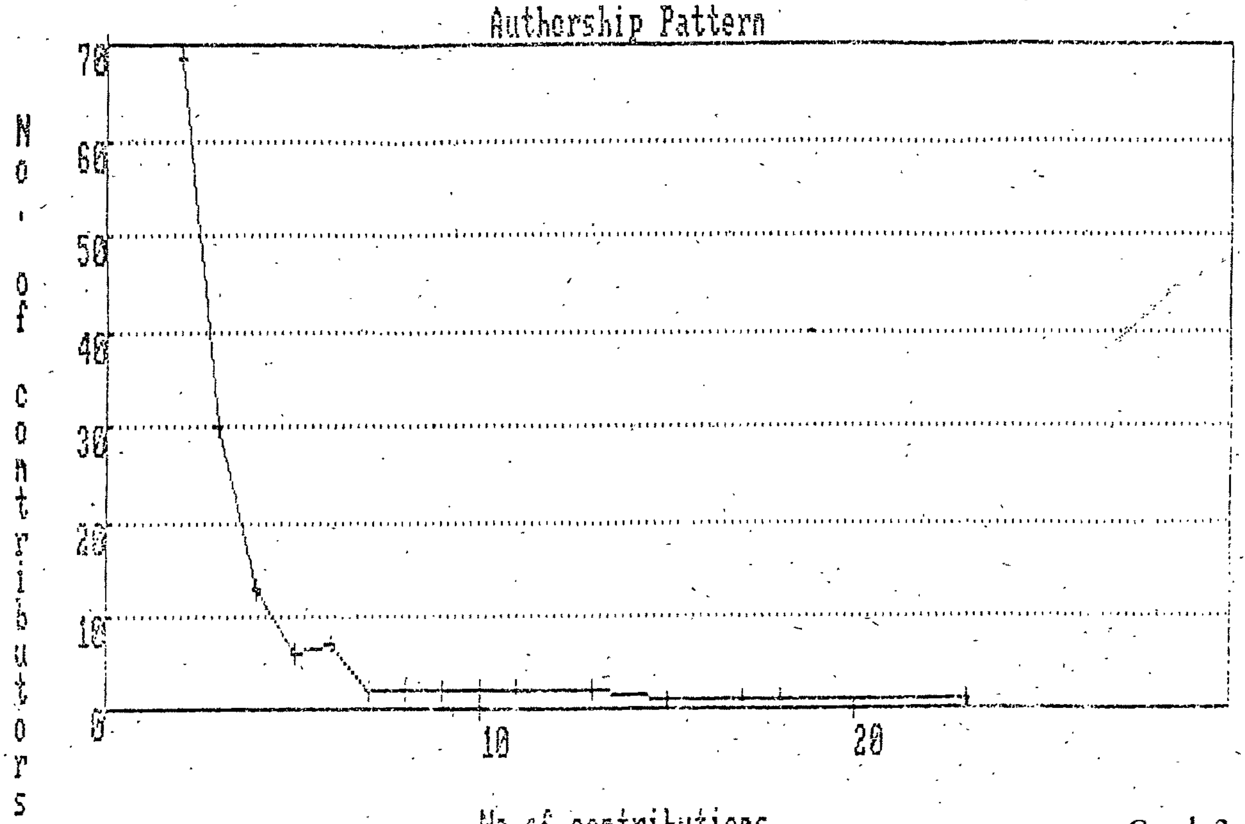
Author Productivity

Author productivity is one of the numerous factors to identify or distinguish eminent scholars in the field (Price 1963). Only the first author was taken into account for the study of the authorship. A total of 408 authors were identified contributing 808 articles out of which 65.44% have single contribution, i.e., one author contributing only one article (Table 1). Productivity of authors contributing two or more than two articles each have been graphically represented in graph No. 2. The single contribution dominates as against multiple papers. Also, within a span of ten years, one author could produce a maximum of 23 articles. The ten toppers have produced 17.45% of the total contributions.

Considering second, third and subsequent places in the authorship a rank list prepared



Graph 1



Graph 2

Table 1

Author productivity

No. of Contributions	No. of Authors	Percentage of Authors	Total No. of Contributions
1	267	65.44	267
2	69	16.91	138
3	30	7.35	90
4	13	3.18	52
5	6	1.47	30
6	7	1.71	42
7	2	0.49	14
8	2	0.49	16
9	2	0.49	18
10	2	0.49	20
11	2	0.49	22
12	0	-	
13	2	0.49	26
14	0	-	-
15	1	0.25	15
16	0	-	-
17	1	0.25	17
18	1	0.25	18
19	0	-	-
20	0	-	-
21	0	-	-
22	0	-	-
23	1	0.25	23
Total	408	100.00	808

for the authors contribution more than ten papers each, is presented in Table 1-A.

All the top rankers are from USA. The fourth rank holder Khubchandani, L. has also contributed more articles from abroad and only 5 from India. It is only Dasgupta, Probal and Sharma, V.P. who have contributed only from India. It may be asserted here that the most prolific writers have contributed more from the USA than India itself.

Out of the 30 subject headings used for classification of literature only 13 have been chosen for the study. The work done on Descriptive Linguistics, Socioliguistics, Applied Linguistics and Syntax (Grammar) is found to be significantly more than any other subject. Excepting for authors at serial numbers 6, 7 and 9 (Table 1-B) all others are diverse in their contributions. Usually within a discipline highly productive authors tend to concentrate

Table 1-A

Rank list of Authors who have contributed more than ten articles each

Sl. No.	Author	Country	No. of contributions	Percentage	Rank No.
1.	Singh, Rajendra	USA	23	14.74	1
2.	Kachru, Braj B.	USA	18	11.54	2
3.	Sridhar, S.N.	USA	18	11.54	2
4.	Bhatia, Tej K.	USA	15	9.62	3
5.	Yamuna Kachru	USA	15	9.62	3
6.	Khubchandani Lachman	USA & India	13	8.33	4
7.	Rajeshwari Pandari P.	USA	12	7.69	5
8.	Dasgupta, Probal	India	11	7.05	6
9.	Sharma, V.P.	India	11	7.05	6
10.	Desh Pande, M.M.	USA	10	6.45	7
11.	Mohanan, K.P.	UK & Singapore	10	6.45	7
			156	100	

Table 1-B

Distribution of multiple paper authors across subject categories

Sl. No.	Subject categories	No. of authors	Percentage of authors
1.	Psycholinguistics	11	7.14
2.	Applied Linguistics	23	14.94
3.	Phonology	12	7.79
4.	Syntax	22	14.28
5.	Semantics	2	1.30
6.	Morphology	5	3.25
7.	Discourse Analysis	5	3.25
8.	Theory of Linguistics	7	4.54
9.	History of Linguistics	6	3.90
10.	Descriptive Linguistics	31	20.13
11.	Sociolinguistics	26	16.88
12.	Inter-Personal Behaviour & Communication	2	1.30
13.	Phonetics	2	1.30
	Total :	154	100

more on fewer topics of specialization than others. In order to test the relationship of productivity of authors and their contributions to a number of research areas, a correlation analysis has been done on the date of most profile authors. The analysis of the data and the relevant computations are presented in Table 1-C. The Product moment correlation coefficient, i.e., r, for the data was found out to be 0.63 on the lines followed by Gupta (1985). It suggests that in general there is a positive correlation between the author productivity and the number of subject areas of research. This supports the findings of Gupta (1985) in the area of etymology and suggests that the research interest of a prolific author is in more than one area of specialization.

Subject Analysis

Most preferred topics within linguistics by Indian scholars are reflected in the subject analysis. At the same time it also gives an idea of fields for which there is a dearth in research. The distribution pattern has been graphically represented (Graph No. 3) which shows the contribution of articles to almost all topics under the 30 main headings listed by LLBA excepting two topics: Learning Disability and Psychopathology. Maximum work has been done in Applied Linguistics (132 articles), Descriptive Linguistics (114 articles) and Psycholinguistics (105 articles). The Topics having less than hundred contributions are Sociolinguistics (84) and Syntax (73). The rest of the topics get less than 5% of the contributions. This reflects the interest of Indian scholars and their preference towards the well developed topics than the newly developing topics. Since the coverage of areas within the preferred topics are high, they are once again grouped under each major heading. Table II-A to II-C about subject dispersion are self-explanatory bringing out the need for the linguists to concentrate and contribute more in the lesser touched areas which have got below 5% of the contributions, i.e., language testing, reading and its subgroups, neurolinguistics, etc.

Table 1-C

Sl. No.	No. of contributions X	No. of research topics Y	XY	X^2	Y^2
1.	23	9	207	529	81
2.	18	4	72	324	16
3.	18	5	90	324	25
4.	15	5	75	225	25
5.	15	6	90	225	36
6.	13	4	52	169	16
7.	12	3	36	144	9
8.	11	5	55	121	25
9.	11	3	33	121	9
10.	10	6	60	100	36
11.	10	4	40	100	16
Total	156	54	810	2382	294

$n = 11, \Sigma x = 156, \Sigma y = 54, \Sigma Y = \Sigma XY = 810, \Sigma X^2 = 2382, \Sigma Y^2 = 292;$

$$\overline{X} = \frac{\Sigma x}{n} = \frac{156}{11} = 14.18$$

$$\overline{X}^2 = 201.10$$

$$\sigma^2 X = \frac{\Sigma X^2}{n} - \overline{X}^2 = \frac{2382}{11} - 201.10$$

$$= 216.55 - 201.10 = 15.45$$

$$\sigma X = 3.93 \qquad \ldots(1)$$

$$\overline{Y} = \frac{\Sigma Y}{n} = \frac{54}{11} = 4.91$$

$$\sigma Y^2 = 24.11$$

$$\sigma^2 Y = \frac{Y^2}{n} - Y^2 = \frac{294}{11} - 24.11$$

$$= 26.73 - 24.11 = 2.62$$

$$\sigma Y = 1.62$$

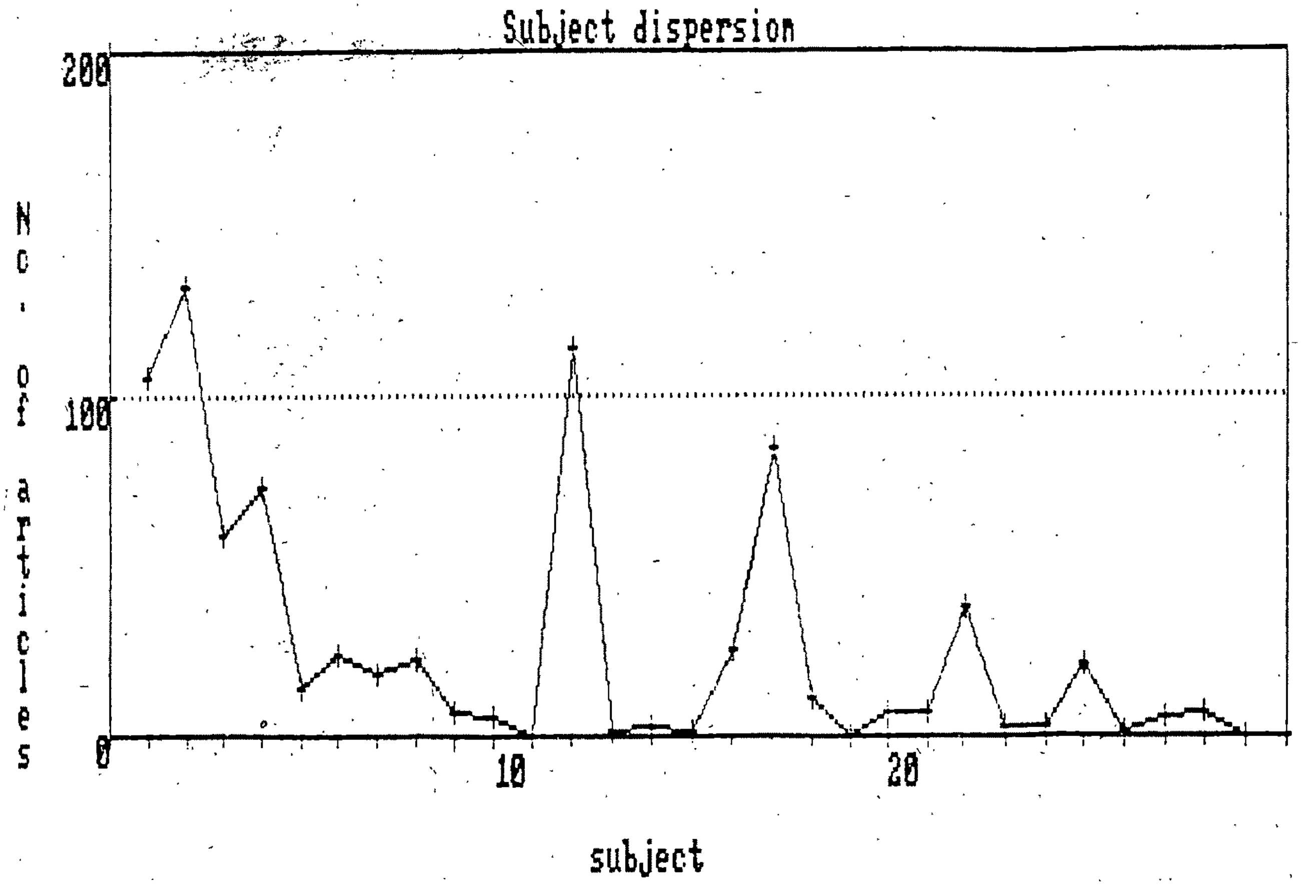
$$r = \frac{\Sigma XY - n\overline{X}\overline{Y}}{n\,\sigma x\,\sigma y} = 810 - 765.86 = \frac{44.14}{70.03}.$$

$$r = 0.63$$

Table II-A

Subject Dispersion: Applied Linguistics

Sl. No.	Subject	No. of articles	Percentage
	APPLIED LINGUISTICS		
1.	Non-native Language Pedagogy	45	34.09
2.	Bilingualism, Bilingual Education	30	22.73
3.	Non-native Language Acquisition	14	10.61
4.	Applied Linguistics	9	6.82
5.	Translation	7	5.30
6.	Native Language Pedagogy	6	4.54
7.	Writing	6	4.54
8.	Adult Language Development	5	3.79
9.	Language Testing	3	2.27
10.	Reading Instruction and Remediation	3	2.27
11.	Reading Processes	3	2.27
12.	Reading	1	0.77
	Total :	132	



Subject

1. Psycholinguistics
2. Applied Linguistics
3. Phonology
4. Syntax
5. Semantics
6. Morphology
7. Discourse Analysis
8. Theory of Linguistics
9. History of Ling.
10. Anthropological Ling.
11. Structural Ling.
12. Descriptive Ling.
13. Lexicography
14. Orthography
15. Typology
16. Interpersonal Behaviour and Communication
17. Sociolinguistics
18. Poetics, Stylistics
19. Nonverbal Commn.
20. Semiotics
21. Philosophy of Lang.
22. Phonetics
23. Hearing and Speech Physiology
24. Hearing-Pathological and normal
25. Language -do-
26. Mental Retardation
27. Special education
28. Psychometrics
29. Learning Disabilities
30. Psychopathology

Graph 3

Table II-B
Subject Disperson

Sl. No.	Subject	No. of articles	Percentage
1.	Descriptive Linguistics	26	22.81
2.	Computational and Mathematical Linguistics	23	20.17
3.	Diachronic Linguistics	21	18.42
4.	Comparative Linguistics	13	11.40
5.	Language Area Studies	12	10.53
6.	Language in Contact	9	7.89
7.	Dialectology	8	7.02
8.	Language Universals	2	1.75
	Total :	114	

Table II-C

Subject Disperson: Psycholinguistics and Allied Fields

Sl. No.	Subject	No. of articles	Percentage
1. 2.	Verbal Learning Paired Associate, Serial Learning	2	2.02
3.	Memory, Recognition	36	34.28
4.	Child Language Acquisition	23	21.90
5.	Psycholinguistics	17	16.19
6.	Language and Cognition	13	12.38
7.	Semantic Processing	6	5.71
8.	Syntactic Processing	3	2.86
9.	Neurolinguistics	3	2.86
10.	Psychoacoustics	2	1.90
	Total :	105	

Geographical Analysis (Author's affiliation)

The affiliation of the authors mentioned in the LLBA are analysed in Table III which covers all authors excepting 19 for which the affiliation could not be traced.

Table III

Geographical Distribution of Authors :

Sl. No.	Name of the Country	No. of articles	Percentage
1.	India	435	55.13
2.	U.S.A.	209	26.49
3.	Australia	53	6.72
4.	U.K.	28	3.55
5.	Sweden	9	1.14
6.	Singapore	8	1.01
7.	Africa	8	1.01
8.	Hawaiian Islands	7	0.89
9.	Germany	6	0.76
10.	Honolulu	5	0.63
11.	Nepal	5	0.63
12.	France	4	0.51
13.	The Netherlands	3	0.38
14.	Japan	2	0.25
15.	Italy	2	0.25
16.	Bangladesh	1	0.13
17.	Fiji Islands	1	0.13
18.	Afghanistan	1	0.13
19.	Saudi Arabia	1	0.13
20.	Belgium	1	0.13
	Total :	789	100

A study of Table III reveals that more than 55% of the articles were contributed by authors from India and the rest from abroad. Among the overseas authors, 50% are from USA and the rest come from 18 countries including developing countries. This is indicative of the prolific contributions made by Indian authors living abroad.

The contributions from India are further grouped under Indian States and Union Territories. It is observed that out of the twenty five states and seven Union Territories of India, authors from only 14 states and one Union Territory have contributed in the field, as shown in Table III-A.

Contributions of authors from Kerala, Bihar and Assam are significantly lower compared to other States. Further, to analyse the quantum of research work from institutions within India, the articles were analysed institution-wise. On the whole the contributions emanated from nearly 120 institutions, colleges and universities.

The rank list given in Table III-B highlights the institutions and universities which have contributed more than 5 articles each.

The above finding is not surprising, because the institutions ranking first and second, i.e., Central Institute of English and Foreign languages (CIEFL) (43) and Central Institute of Indian Languages (CIIL) (34) are established by the Ministry of the Central Government for the development and promotion of research in Linguistics and allied disciplines. This finding becomes even more significant in the light of the observation that the maximum contribution is from the staff of the Central Institute of English and Foreign Languages and Osmania University which is published in the Journals brought out by these institutions.

The largest number of contributions from Andhra Pradesh may also be attributed to the large number of contributions from the staff members of the CIEFL and Osmania University, Hyderabad.

Language Analysis :

In a multilingual country like India, the study without language analysis remains incomplete. More than 60% of the articles considered for analysis do not deal with any language at all and rest 288 articles deal with one or more than one language.

The data are grouped under different langu-

Table III-A

Geographical Distribution of Authors in India

Sl. No.	State	No. of articles	Percentage	Rank No.
1.	Andhra Pradesh	75	17.24	1
2.	Maharashtra	64	14.71	2
3.	Uttar Pradesh	63	14.48	3
4.	Karnataka	44	10.11	4
5.	Delhi	43	9.88	5
6.	Madhya Pradesh	40	9.20	6
7.	Punjab	18	4.14	7
8.	West Bengal	17	3.91	8
9.	Orissa	16	3.68	9
10.	Tamil Nadu	14	3.22	10
11.	Gujarat	12	2.76	11
12.	Rajasthan	12	2.76	11
13.	Bihar	9	2.07	12
14.	Kerala	5	1.15	13
15.	Assam	3	0.69	14
	Total :	435	100	

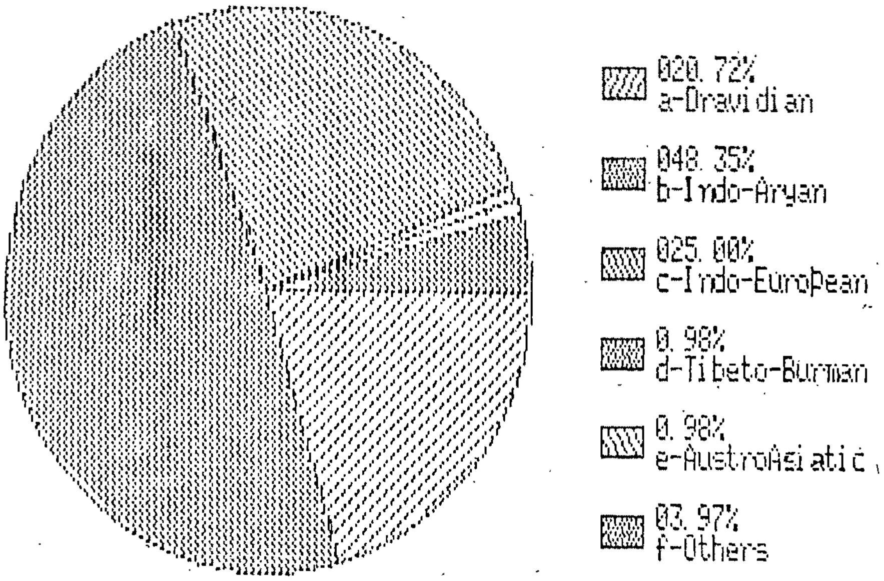
age families as presented in Table-IV and graph No. IV. It is observed that the maximum contributions are on Indo-Aryan language whereas the number of contributions for Austroasiatic and Tibeto-Burman languages are negligible. The contributions for languages which come under the above families are also highlighted in Table IV-A to IV-E for language-wise distribution of articles.

Irrespective of the language families among the Indian languages, Hindi tops the list (78 articles). It has full justification because of Hindi being the national and official language of India. But suprprisingly, Central Institute of Hindi (CIH) which was established by the Central Government for promotion of research exclusively on Hindi lags behind in its contribution (Table III-B). However, most of the prolific authors like Taj Bhatia, Yamuna Kachru, Rajinder Singh, etc., (Table I-B) are observed to have worked more on Hindi. Though not specified under the scheduled languages of India, English scores the second (67 articles) position. This is supportive of the earlier finding with reference to Table (II-A) on subject analysis under applied linguistics that among all the subjects "Non-native Language Pedagogy" has maximum number of contributions.

Out of the scheduled languages of India, little work is reported for Assamese, and only a limited number of contributions for Gujarati and Kashmiri.

The smallness of the component of contributions for tribal languages (8%) does not reflect well at the International level. It is needless to mention that there is a need to take into account all the Indian languages and project them through periodical literature at the International level.

There is a vast difference between writing on a language and writing in a language. The



Graph 4

Table III-B

Rank List of Institutions

Sl. No.	Name of the Institution	No. of articles	Rank No.
1.	CIEFL - Hyderabad & Shillong	43	1
2.	CIIL - Mysore & its Centres	34	2
3.	Osmania University, Hyderabad	31	3
4.	Deccan College, Pune	25	4
5.	Delhi University, Delhi	25	4
6.	Ravishankar University, Raipur	24	5
7.	Utkal University, Cuttack	23	6
8.	IIT, Kanpur, Delhi, Bombay & Calcutta	17	7
9.	Banaras Hindu University, Varanasi	11	8
10.	Annamalai University, Tamil Nadu	9	9
11.	University of Saugar	7	10
12.	Jawaharlal Nehru University, New Delhi	6	11
13.	Calcutta University, Calcutta	6	11
14.	Punjab University, Chandigarh	6	11
15.	Centre for Communication Studies	6	11
16.	Central Institute of Hindi	5	12
17.	Indian Institute of Science, Bangalore	5	12
18.	University of Lucknow, Lucknow	5	12
	Total :	288	

Table IV-A

Dravidian Languages (Rank List)

Sl. No.	Language	No. of articles	Percentage	Rank No.
1.	Tamil	22	34.92	1
2.	Telegu	16	25.40	2
3.	Kannada	8	12.70	3
4.	Malayalam	8	12.70	3
5.	Dravidian (Gen.)	2	3.17	4
6.	Toda	2	3.17	4
7.	Tulu	2	3.17	4
8.	Erukula	1	1.19	5
9.	Koya	1	1.19	5
10.	Parji	1	1.19	5
		63	100	

Table IV-B

Indo-Aryan (Rank List)

Sl. No.	Language	No. of articles	Percentage	Rank No.
1.	Hindi	378	53.06	1
2.	Bengali	18	12.24	2
3.	Sanskrit	9	6.12	3
4.	Urdu	9	6.12	3
5.	Maithili	7	4.76	4
6.	Marathi	4	2.72	5
7.	Oriya	4	2.72	5
8.	Punjabi	4	2.72	5
9.	Indo-Aryan (Gen.)	3	2.04	6
10.	Bagheli	2	1.36	7
11.	Bhojpuri	1	0.68	8
12.	Brijia	1	0.68	8
13.	Gujarati	1	0.68	8
14.	Haryanvi	1	0.68	8
15.	Kashmiri	1	0.68	8
16.	Kumaoni	1	0.68	8
17.	Mandyali	1	0.68	8
18.	Prakrit	1	0.68	8
19.	Sindhi	1	0.68	8
		1467	100	

Table IV-C

Indo-European (Rank List)

Sl. No.	Language	No. of articles	Percentage	Rank No.
1.	English	67	88.16	1
2.	French	4	5.26	2
3.	Russian	2	2.63	3
4.	German	1	1.31	4
5.	Indo-European	1	1.31	4
6.	Spanish	1	1.31	4
		76	98	

Table IV-D

Tibeto-Burman (Rank List)

Sl. No.	Language	No. of articles	Percentage	Rank No.
1.	Konyak	1	33;3	1
2.	Rongmei Naga	1	33.3	1
3.	Maghi	1	33.3	1
		3		

Austroasiatic

Khasi	3

Table IV-E

Others (Rank List)

Sl. No.	Language	No. of articles	Percentage	Rank No.
1.	Hebrew	2		1
2.	Andamanese	2		1
3.	Arabic	1		2
4.	Armenian	1		2
5.	Chinese	1		2
6.	Gothic	1		2
7.	Japanese	1		2
8.	Vietnamese	1		2
		10		

language of articles in International Journals by Indian authors is generally taken as English only because, as a rule, the foreign journals do not publish articles in Indian languages. It is both a surprising and a remarkable finding that ten articles in foreign language written by Indians were on languages as follows :

1. Russian - 4 articles (Two deal with Russian language written by an Indian resident)
2. French - 3
3. Bulgarian - 1

Chronological Analysis

The chronological analysis provides indication of the period(s) of maximum concentration of research effort.

Though the study pertains to the issue of LLBA brought out during 1977-78, some of the articles included in the study were primarily published in 1971. Hence, the articles under study are dispersed over a period of 16 years (Table-V).

Focussing on the number of articles published during 1976-1986, the maximum contribution by Indian authors were in 1979. Except for 1985 (72 articles) the table shows a regular decline in the contributions from Indian authors.

Most preferred periodicals

The identification of the most preferred periodicals by Indian authors for publishing their research output is also one of the objectives of the present study. Out of the 632 journals monitored by the LLBA, linguists of Indian origin have contributed to 186 journals. Instead of listing all the 186 journals, a rank list of 34 journals is prepared (Table VI) each reporting 5 or more number of articles from authors of India origin. For each title, the country of origin is also mentioned.

Table VI shows that more than 60% of the articles are contributed by 5 journals among

Table V

Chronological distribution of publication of articles:

Year	No. of articles	Percentage
1971	13	1.61
1972	9	1.11
1973	11	1.36
1974	21	2.60
1975	24	2.97
1976	73	9.03
1977	45	5.57
1978	83	10.27
1979	86	10.64
1980	74	9.16
1981	73	9.03
1982	62	7.92
1983	64	7.92
1984	57	7.05
1985	72	8.91
1986	34	4.21
1987	7	0.87

which 4 journals are of Indian origin and one is from USA. Indian authors have shown their preference for Indian journals only, the third place secured by foreign journals is due to the preference of most prolific writers residing abroad (Table 1-B), more than 20 articles being contributed by them. Likewise most prolific writers residing in India have contributed to Indian Journals. For example Sharma, V.P. [6th place (in Table 1-B)] has contributed all the articles to the Journal Psycholingua of which he is an editor.

The origin-wise distribution of all the 186 journals (Table VI-A) gives a distinct picture about the journal output.

From this table it can be seen that India has the highest number of articles (42.20%) published in a very limited number of periodicals (15). On an average each journal contains 22.73 articles. Whereas USA which tops in the number of periodicals has one journal for every 2.56 articles, UK has 2.56, Netherlands 2.88 and Germany and Switzerland have 5 articles for every journal.

It is a proven fact that India is far behind as compared to other countries in publishing journals in linguistics and allied fields. As far as foreign journals are concerned, 57.8% of the

Table VI

Rank List of Preferred Periodicals

Sl. No.	Rank No.	Name of Periodical	Country	No. of articles	Percentage
1.	1	Psycholingua	India	140	24.25
2.	2	Indian Linguistics	India	126	22.07
3.	3	Studies in the Linguistic Sciences	USA	47	8.22
4.	4	CIEFL Bulletin (India)	India	30	5.25
5.	5	Osmania papers in Linguistics	India	21	3.68
6.	6	International J. of the Sociology of Language	Germany	16	2.80
7.	7	Lingua (The Netherlands)	The Netherlands	12	2.10
8.	7	Papers for the Regional Meetings of Chicago Linguistic Society	USA	12	2.10
9.	8	Audiology	Switzerland	11	1.90

Sl. No.	Rank No.	Name of Periodical	Country	No. of articles	Percentage
10.	8	Language Sciences	Japan	11	1.92
11.	9	Journal of Phonetics	UK	8	1.40
12.	9	Speech Communication	Netherlands	8	1.40
13.	10	Anthropological Linguistics	USA	7	1.22
14.	10	English Language Teaching Journal	UK	7	1.22
15.	10	IRAL	Germany	7	1.22
16.	10	Linguistic Inquiry	UK	7	1.22
17.	11	Bulletin of the SIE, Maharashtra	India	6	1.05
18.	11	ITL Review of Applied Linguistics	Belgium	6	1.05
19.	11	Linguistics	Germany	6	1.05
20.	11	Papers in Linguistics	USA	6	1.05
21.	11	Sociolinguistics	Netherlands	6	1.05
22.	11	Speech Transmission Laboratory Quarterly Progress & Status Report	Sweden	6	1.05
23.	12	Acoustica	Germany	5	0.88
24.	12	The British Journal of Psychology	UK	5	0.88
25.	12	Computers and the Humanities	USA	5	0.88
26.	12	Dissertations Abstract	USA	5	0.88
27.	12	International Journal of Communication Disorders	USA	5	0.88
28.	12	Journal of Indian Anthropological Society	India	5	0.88
29.	12	Journal of Pragmatics	The Netherlands	5	0.88
30.	12	Language	USA	5	0.88
31.	12	Linguistic Analysis	USA	5	0.88
32.	12	Phonetica	Switzerland	5	0.88
33.	12	Semiotica	Germany	5	0.88
34.	12	Studies in Language Learning	USA	5	0.88
35.	12	TESOL Quarterly	USA	5	0.88
		Total :		571	100

Table VI-A
Geographical distribution of periodicals and articles in them

Sl. No.	Country	No. of Periodicals	Percentage	No. of articles	Percentage
1.	USA	82	44.09	218	26.98
2.	UK	25	13.44	64	7.92
3.	Netherlands	18	9.68	52	6.45
4.	India	15	8.06	341	42.20
5.	Germany	8	4.30	42	5.20
6.	Australia	7	3.76	11	1.36
7.	Japan	4	2.15	16	1.98
8.	Hungary	3	1.62	3	0.37
9.	Switzerland	3	1.62	17	2.10
10.	Austria	2	1.07	2	0.25
11.	Belgium	2	1.07	7	0.87
12.	France	2	1.07	2	0.25
13.	Hawaii	2	1.07	3	0.37
14.	Singapore	2	1.07	5	0.62
15.	Sweden	2	1.07	8	0.99
16.	Tehran	2	1.07	4	0.49
17.	USSR	2	1.07	5	0.62
18.	Bulgaria	1	0.54	1	0.12
19.	Italy	1	0.54	2	0.25
20.	Korea	1	0.54	1	0.12
21.	Rumania	1	0.54	3	0.37
22.	Thailand	1	0.54	1	0.12
	Total :	186	100	808	100

total number of articles have been published in 91.04% of the periodical literature which highlights richness of journal literature from countries abroad. In spite of the large publishing outlets through foreign journals in linguistics Indian nationals have shown their preference to Indian journals. The following could be some of the possible reasons:

1. Number of journals published in India in linguistics is very limited.
2. Indian authors prefer to publish their articles in journals published by their own institutions or associations.
3. Strict refereeing of the foreign journal may be standing in the way of acceptance of the works of the Indian authors.

Therefore, publication of Indian journals focussing on inter-discplinary areas has to be increased and simultaneously their coverage in

LLBA encouraged to get international readership.

CONCLUSIONS

Solo research as against multiple authored efforts is predominant. As far as author productivity is concerned, single contributions exceed multiple contributions. The subject dispersion reflects that the researchers have contributed more on developed topics than the developing ones.

Though the contribution from India tops the list, the most prolific authors have contributed from the USA. Within the Indian States, CIEFL, Hyderabad from Andhra Pradesh tops the list. The Central Institute of Indian Languages has contributed equally to the field. Excepting Hindi, Bengali, Sanskrit and Urdu, many major languages under the Indo-Aryan family of languages need more attention from researchers. The quantum of research on tribal languages of India refects the lack of attention from researchers. It is evident from the chronological break-up that the contributions to journal articles are on the decline.

Further, most prolific authors in linguistics residing abroad prefer to publish in foreign journals as against prolific authors and researchers residing in India who are inclined to publish their works in Indian journals only. This is in contrast to the position in the field of science and technology where the authors usually prefer to get their articles published in foreign journals.

Since journal articles are the primary carriers of current developments in a given subject, a glance at the research conducted highlights the need for Indian scholars to work on the newly developing areas and on various Indian languages including the tribal languages. This will enable to promote the growth of linguistics at both the national and international levels. Also, if all the journals in linguistics published in India are included in LLBA and get their journal articles abstracted, the journals will at least get International readership.

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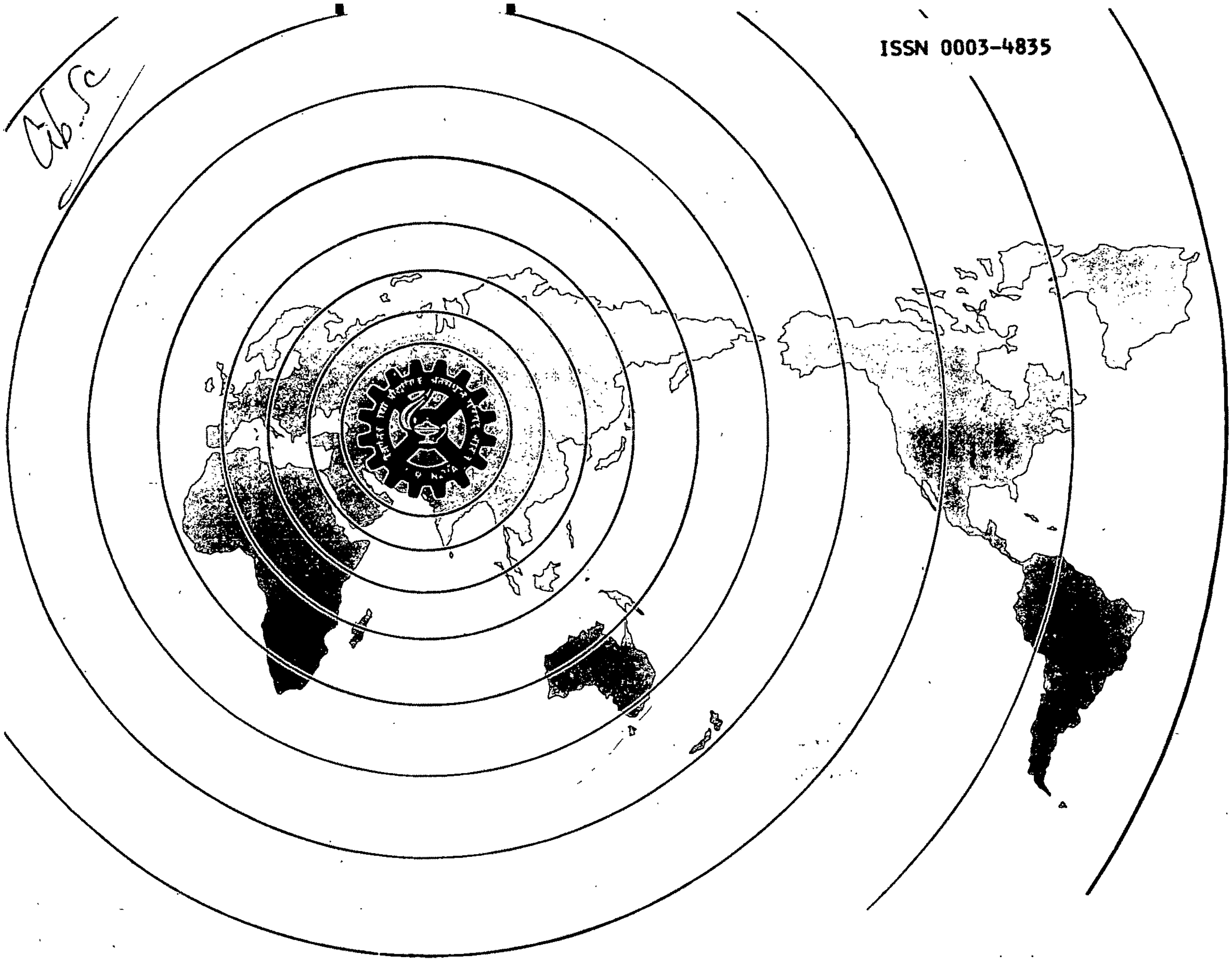

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USER STUDIES IN LIBRARIES OF AGRICULTURAL UNIVERSITIES
1. FACULTY PARTICIPATION AND LIBRARY USE AT POSTGRADUATE LEVEL

Dr. Harpal Kaur Malhotra
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Kaoni (PAU)

Studies the role of the faculty in promoting library use by the post graduate students. Two independent samples of post graduate students have been taken, one each, from Haryana Agricultural University, Hisar, and Punjab Agricultural University, Ludhiana to make an in-depth study. This study identified and ranked statistically a total of nine variables which could be used to predict whether method of instruction of teachers is library based or otherwise. The stated hypothesis has been tested by the use of Spearman's Rank Correlation Coefficient in two different sample groups and their results compared.

INTRODUCTION

The review of literature showed results which lead to divergent conclusions with the result that well defined trends in the relationship of faculty participation and library use at post graduate level in academic libraries could not be ascertained. Branscomb found that the major responsibility for students use or lack of use of the college library lies with the faculty. D.J. Olorunmeye [4] reported that there is a high positive correlation between faculty methods of instruction and students' library use with a Chi Square of 88.8, a coefficient of .614 and significance level beyond .01. Although the faculty was found to be a major agent impelling students to use the library, the physical condition of the library and the attitudes of the library staff also contributed significantly towards the use of library by the students and faculty members. E.B.Rosa [2] also noted a direct relationship between the biology students and their advisers concering the knowledge and use of library resources while no such relationship could be seen between the history students and their advisers. No evidence was found for either group in support of the hypothesized causal relation: influence of the advisor on the information seeking habits of his/her advisees. Emdad A and Rogers A R [5] noted that student use of books and libraries in academic institutions depends largely on the faculty attitudes towards the library, its role in the educational process and the way the faculty promotes students' use of the library by their own example as well as their teaching methods. They concluded that students of Pahlavi University do not make full use of the library resources and faculty members do not promote the use of the library by the students.

METHODOLOGY

The following hypothesis is framed and tested:

HYPOTHESIS

Method of teaching of teachers has an effect on the extent of use made of the university library by postgraduate students.

Several indicataors were used to test this hypothesis: Type of the method used for teaching, frequency of giving work assignments, giving references after lectures, lessons, assignments, etc. In short, this study identified and ranked statistically a total of 9 variables which could be used to predict that the method of instruction followed by the teachers is library-based or otherwise. The range of the scores for the distribution was the closed interval [1,6]. The two bounds of the interval 1,6 indicate the highest and lowest limit for the (library-based) method of instruction. Table 1 gives the distribution of scores in a number of half open intervals in case of the subjects of Haryana Agricultural University and Punjab Agricultural University. Calculation of the scores for the dependent variable, namely library use, has been discussed under the heading quantum of daily work done.

METHOD OF INSTRUCTION FOLLOWED BY TEACHERS (THE INDEPENDENT VARIABLE)

To test the significance of difference between the two sample groups under investigation regarding the method of instruction followed by teachers, K.S. Chi Square Test is applied. The stated hypothesis has been tested by the use of Spearman's Rank Correlation Coefficient in two different sample groups and the results compared. K.S. test statistic is found insignificant at 0.05 level of significance. Hence the two groups are homogeneous concerning the method of instruction followed by the teachers of post graduate students.This finding is supported further by the study of percentiles of the respective frequency distributions (Table 2). As the medians coincide, both the distributions are symmetrically distributed around their respective medians. A study of trends in the use of various teaching methods may be made from Table 3 which gives the frequency distribution of the two samples with respect to the highest priority shown to the various teaching methods by teachers, from the largest response category to the least response category. It is evident from this table that both the sample groups show similar trends in the priority shown by teachers to the various teaching methods.

TABLE 1

Method of teaching followed by teachers of postgraduate students: frequency distributions

Sample Group		HAU			PAU		
Magnitude of Response		Frequency	%	Cumulative Frequency	Freq-ency	%	Cumulative Frequency
	[0,1]	1	0.59	170	5	2.49	201
Method	(1,2]	5	2.94	169	8	3.98	196
of	(2,3]	13	7.65	164	25	12.44	188
Teach-	(3,4]	113	66.47	151	108	53.73	163
ing	(4,5]	34	20.00	38	48	23.88	55
	(5,6]	4	2.35	4	7	3.48	7
	Total	170			201		

One Way Chi Square (HAU) = 246.06; Significance Level = .01; Degrees of Freedom = 4

One Way Chi Square (PAU) = 167.43; Significance Level = .01; Degrees of Freedom = 4

Kolmogorov-Smirnov Chi Square = 2.20; Not Significant; Degreesof Freedom = 2

TABLE 2

Method of teaching followed by teachers of post graduate students

Percentiles of frequency distributions

Percentiles	HAU	PAU	Remarks
P10	2.85	2.28	1 = The Highest Score 6 = The Least Score
P25	3.21	3.11	Location of the Median shows that the groups do not differ
P50 (Median)	3.58	3.58	Regarding the method of teaching followed by teachers of postgraduate students as the medians coincide both the distributions are distributed symmetrically around the Median.
P75	3.96	4.10	
P90	4.62	4.73	

TABLE 3

Method of teaching followed by teachers of postgraduate students from the largest response category to the least response category.

HAU S.NO.	Frequency	PAU S.No.	Frequency
1. Lecture method	156	1. Lecture method	172
2. Seminar method	137	2. Seminar method	137
3. Combination of two or more methods of teachning	114	3. Combination of two or more methods of teaching	86
4. Audio visual aids, use of	104	4. Tutorial method	68
5. Turorial method	94	5. Audio visual aids, use of	67

QUANTUM OF DAILY WORK DONE (THE DEPENDENT VARIABLE)

The quantum of use made of the university library in a day by the post graduate students is regarded as the dependent variable and is self reported by the student. For the sake of clarity, library use in the present investigation is defined as the number of tasks performed per day by a user out of the following eleven tasks having direct relevance to the aims and objectives of a university library: (1) preparing lessons, (2) collecting material for research, (3) locating information in books, (4) locating information in periodicals, (5) consulting unknown items, (6) searching literature in a particular field, (7) browsing through new arrivals of books,

(8) borrowing/returning books, (9) ordering/collecting a xerox copy, (10) using microreading equipment and (11) preparing assignments. The respondent was asked whether he performs each of these tasks (1) frequently, (2) occasionally or (3) never. By frequently it was meant everyday whereas occasionally implied once a week. Hence the total number of tasks performed by each student per day was computed ~~by~~ using the formula:

$$\frac{\text{Number of frequent tasks}}{1} + \frac{\text{Number of occasional tasks}}{7}$$

= Total number of tasks done in a day.

This gave a fairly approximate picture of the library use made by each respondent. It can be seen that the quantum of daily library use falls in the closed interval [0,11]. Table 4 gives the frequencies of the quantum of daily library use falling in the half open intervals along with the percentages and cumulative frequencies for Haryana Agricultural University and Punjab Agricultural Univeristy. The significance of the difference between two groups has been tested by the use of the K.S. Chi Square Test. This test statistic is found significant at 0.05 level of significance. Therefore, the two groups are not homogeneous regarding the quantum of daily library use made by respective post graduate students. But it remains to ascertain the direction of difference as to the user group which performs greater quantum of daily library use. A look at Table 4 suggests that the HAU sample group makes greater quantum of daily library use as compared to the PAU sample group. The application of one-tail K.S. Chi Square Test supports this idea as the test statistic is found significant at 0.05 level of significance. Therefore it may be concluded that the HAU subjects perform greater quantum of daily library use. This finding is further supported by the location of the respective medians (see Table 5).

TABLE 4

Quantum of daily library use: Frequency distributions

Sample Group Magnitude of Response	HAU Frequency	HAU %	HAU Cumulative Frequency	PAU Frequency	PAU %	PAU Cumulative Frequency
(10,11]	3	1.76	170	3	1.49	201
(9,10]	7	4.12	167	2	1.00	198
(8,9]	4	2.35	160	5	2.49	196
(7,8]	9	5.29	156	7	3.48	191
(6,7]	13	7.65	147	17	8.46	184
(5,6]	23	13.53	134	17	8.46	167
(4,5]	20	11.76	111	32	15.92	150
(3,4]	22	12.94	91	39	19.40	118
(2,3]	23	13.53	69	23	11.44	79
(1,2]	30	17.65	46	26	12.94	56
[0,1]	16	9.41	16	30	14.93	30
Total	170			201		

One Way Chi Square (HAU) = 8.64; Not Significant; Degrees of Freedom = 7

One Way Chi Square (PAU) = 18.58; Significance Level = .01: Degrees of Freedom=7

Kolmogorov-Smirnov Chi Square = 6.10; Significance Level = .05 : Degrees of Freedom = 2

TABLE 5

Quantum of daily library use: percentiles of the frequency distributions

Percentiles	HAU	PAU	Remarks
P10	1.03	0.67	11= The Highest Score 0= The Least Score. Location of the respective Medians show that a greater number of HAU subjects performed larger quantum of daily library use as compared to PAU subjects as 3.73 is nearer to 11 as compared with 3.55
P25	1.88	1.78	
P50 (Median)	3.73	3.55	
P75	3.72	5.04	
P90	7.67	6.82	

SPEARMAN'S RANK CORRELATION COEFFICIENT

To calculate the Spearman's Rank correlation coefficient, the scores for the two variables (the dependent and the independent variable) were translated into rankings and their relationships were studied in detail.

To test the hypothesis, the value of r_s was calculated [7] to be $r_s = .07$ $n = 170$ in case of HAU sample group and $r_s = .11$, $n = 201$ in case of PAU sample group.

The correlation turned out to be insignificant at 0.05 level of significance for the two sample groups. This led to the acceptance of the null hypothesis i.e.,the data did not support the hypothesis in any of the two sample groups. It is therefore, concluded that teachers of post graduate students of the HAU as well as the PAU sample groups do not contribute positively to the use made of the library by post graduate students. There may be some unexplained motivational factors which motivate the post graduate students to make use of their respective university libraries.

RECOMMENDATIONS

1. It is observed that the major responsibility for motivating the post graduate students to make an effective use of the library lies with the faculty, and the faculty's role is minimum in this direction. Reading lists and books may be introduced in class and more assignments may be given. Desirable results can be achieved by properly orienting the post graduate students to make use of the library.

2. The study showed that post graduate students of the two universities do not know exactly what to expect from the library. All the post graduate students may be given training in literature search and use of library with the following objectives:

   a). To make use of the library effectively,
   b). To train them in literature search,
   c). To acquaint them with the existing literature in agriculture and allied sciences,
   d). To make them understand the value and use of various reference tools in agriculture and allied sciences and
   e). To teach them how to compile a bibliography.

3. A full fledged section for research on user studies may be made part and parcel of every university library. This section will continuously survey the existing conditions and recommend concrete suggestions for improvement. After the recommendations have been enforced, again a follow up survey may be made after one or two years to study the effect of the changes made. This section will also lay down proposals for the allocation of budget for the relevant reading materials and for the improvement of various library services.

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USER STUDIES IN LIBRARIES OF AGRICULTURAL UNIVERSITY
2. MEETING THE INFORMATION REQUIREMENTS OF POSTGRADUATE STUDENTS

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Studies the relationship between the adequacy of library collection and the quantum of daily library use. Two independent samples of post graduate students have been taken, one each from Haryana Agricultural University, Hisar, and Punjab Agricultural University, Ludhiana. The Spearman's Rank Correlation Coefficient has been calculated for two different sample groups and the results have been compared.

INTRODUCTION

The increasing awareness in educational institutions regarding library effectiveness has prompted the librarians to evaluate their degree of response to user needs for information. In recent years the concept of library collection has changed from quantity to quality. A mere size of a library collection is not a positive proof of its usefulness. From the review of literature [1], it is clear that users attach maximum importance to the relevancy of the needed material rather than to any other aspect of the library. It is evident also from the author's investigation [8] that greatest concern as well as dissatisfaction of the users has always been linked to the reading materials.

METHODOLOGY

Based on the empirical findings the hypothesis is framed as:

HYPOTHESIS

The use of the library is directly proportional to the relevancy of the library resources to the contemporary needs of the student community.

To construct the scores of the independent variable (adequacy of library resources) a number of questions concerning this aspect were asked. The questions related to the adequacy of reading materials were provided with two (or more) response categories viz. 1) yes, 2) sometimes, 3) never. The highest score was fixed at 1 and the lowest at 7. A score of 4 was treated as the neutral point. Cumulative effect of all the questions regarding the adequacy of reading materials was taken by using the expression (1.A+4.B+7.C)/ (A+B+C) where A, B and C are the frequencies of the responses 1, 4 and 7 respectively. In other words, the process of taking cumulative effect may be expressed as : a single weighted (average) score for each respondent was calculated by summing each columns ranking for a question and dividing by the number of questions or columns. The order was reversed in case of a question where a negative reply indicated adequacy of reading materials.

It is obvious that the scores of the entire sample belonged to the closed interval [1,7] with 1 and 7 as the two bounds of the interval. A number of predictors have been used to ascertain the adequacy of library resources, namely order of priority shown for the university library, adequancy of library collection for individual research and for the projected research, references, assignments, primary sources, reference collection, indexing and abstracting sources, books, scientific and technical periodicals etc. In short this study identified and ranked statistically a total of 15 variables which could be used to predict the adequacy of library resources for post graduate students engaged in study and research.

Table 1 gives the frequencies falling under various categories formed of half open intervals and other descriptive data. Calculation of scores for the dependent variable (i.e., library use) has been discussed under the heading "Quantum of daily work done"

The significance of a difference in opinion concering the adequacy of library resources between the two user groups has been tested by the use of K.S.Chi Square Test. The stated hypothesis has been tested by the use of Spearman's Rank Correlation Coefficient in different sample groups and the results have been compared.

ADEQUACY OF LIBRARY RESOURCES; THE DEPENDENT VARIABLE

K.S. test statistic is given in Table 1 and is found insignificant at 0.05 level of significance. Table 1 also suggests that the HAU user group reported a greater satisfaction with the adequacy of library resources than the PAU user group. The location of the respective medians in Table 2 supports the above observation. It may be concluded that the HAU group has more favourable perceptions about the adequacy of its library resources as compared to the PAU subject though the magnitude of the observed difference is not significant statistically.

TABLE 1

Adequacy of library resources : frequency distribution

Sample group Magnitute of Response		HAU Fre-quency	HAU %	HAU Cumulative Frequency	PAU Fre-quency	PAU %	PAU Cumulative Frequency
Adequacy of Library Resources	[0,1]	2	1.18	170	4	1.99	201
	(1,2]	44	25.88	168	37	18.41	197
	(2,3]	75	44.12	124	77	38.31	160
	(3,4)	33	19.41	49	58	28.86	83
	(4,5]	8	4.71	16	21	10.45	25
	(5,6]	8	4.71	8	4	1.99	4
	(6,7]	0	0.00	0	0	0.00	0
		170			201		

One Way Chi Square (HAU) = 93.47; Significance Level =.01; Degrees of Freedom = 4

One Way Chi Square (PAU) = 83.35; Significance Level = .01;Degrees of Freedom=4

Kolmogorov-Smirnov Chi Square = 5.73; Not Significant; Degrees of Freedom = 2

TABLE 2

Adequacy of library resources: percentiles of the frequency distributions

Percentiles	HAU	PAU	Remarks
P10	1.34	1.44	1 = The Highest Score
P25	1.92	2.12	7 = The Least Score
P50 [Median]	2.52	2.77	Location of the median shows that a greater number of HAU subjects have better perceptions about the adequacy of library resources as compared to PAU subjects as 2.52 is nearer to 1 as compared with 2.77
P75	3.20	3.56	
P90	3.97	4.23	

QUANTUM OF DAILY WORK DONE; THE DEPENDENT VARIABLE

The quantum of use made of the university library in a day by the post graduate students was regarded as the dependent variable. It is the self reported library use. The mode of collection, computation and tabular presentation of the dependent variable may be recalled from Part 1 [14].

SPEARMAN'S RANK CORRELATION COEFFICIENT

To calculate the Spearman's Rank Correlation Coefficient, the scores for the two variables (dependent and independent) were translated into rankings and their relationships were studied in detail.

The test was completed by examining the significance of r_s [12] for n=170 and 201 representing HAU and PAU sample group respectively. The independent variable attains maximum at 1 and as the intensity decreases, its value in terms of score increases. The rankings in the case of dependent variable were in the reverse order. They were, therefore, inverted so as to fix one direction of increasing value for both the variables. To test the significance of r_s it is stated as:

NULL HYPOTHESIS

$H_O : r_s = O$ here r_s denotes the correlation of the dependent variable with the independent variable.

SIGNIFICANCE LEVEL

$r_s = 0.05, n = 170, 201$

DECISION RULE

a) if r_s > or = tabular value, reject H_O

b) if r_s < tabular value accept H_O

RISK

1) under (a) type I error, concluding that the correlation of r_s is significant when it is not.

2) under (b) type II error, concluding that r_s is not significant when some other statement or relationship is true. To test the hypothesis the value of r_s was calculated to be:

$$r_s = .09 \qquad n = 170$$

$$r_s = .01 \qquad n = 201.$$

The correlation coefficent is too low and fails to reach statistical significance at 0.05 level of significance for any of the sample groups. This leads to the acceptance of the null hypothesis. However, the data do not support it and thus the findings of the study go against the hypothesis in both the sample groups.

To sum up it may be stated that there exists a low (but positive) correlation between the adequacy of library resources and daily library use by post graduate students. At the same time, it is also observed from the study [8] that post graduate students are most critical about the adequacy of library materials. It clearly shows that the adequacy of library resources is of a much greater concern for them than any other aspect of the library. Out of the total of 625 comments [8] on 24 topics, 213 comments (34.08%) were about the adequacy of library resources in the HAU. In PAU sample group the corresponding figures are 846 and 246 (29.08%) respectively. What, then, could be the possible reason of the low correlation. Sections 2,6 and 7 of [8] explain in detail the priorities shown and the use of various types of documents. Findings of section 7 of the same suggest that: 1) post graduate students mainly consult scientific and technical periodicals, 2) there is comparatively low use of other types of reading materials e.g. review journals, reference books, conference proceedings, indexing and abstracting periodicals and they are rarely given any priority. It has also been observed that more than 60% of the post graudate students do not consult indexing and abstracting periodicals which are a valuable source of information for a post graduate student engaged in study and research.

CONCLUSION

The study does not support the hypothesis in any of the two sample groups, the reason being a low use of certain types of documents discussed above. The low use of such vital sources of information by post graduate students may be attributed to: firstly, their unawareness of the potential value of this type of literature, secondly, inadequate collection of such materials in the libraries, and thirdly, they may not have been initiated to the wealth of information contained therein. It is therefore, suggested that efforts may be made to train the post graduate students in the following areas:

a). use of library,
b). literature search,
c). understanding the value and use of reference tools,
d). familiarisation with the existing reference tools in the library and,
e). acquisition of as many relevant sources as possible.

A practical course may be organised on how to use the library effectively for the benefit of postgraduate students.

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MANPOWER DEVELOPMENT IN LIBRARY AND INFORMATION SCIENCE - PRESENT AND FUTURE NEEDS IN THE CONTEXT OF EMERGING TECHNOLOGIES

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Attempts to identify the role and impact of information technology on Library and Information Science (LIS) activities. Depicts the changing scenario in the profession of Library and Informtion Science due to the impact of emerging information technology. Further, identifies the knowledge and skill requirements in LIS personnel to interact with the changing environment and suggests the measures for development of the same to meet the present and future challenges in the profession in the context of emerging technologies.

INTRODUCTION

Informtion is the most important resource handled by LIS personnel. Information dissemination, transfer and communication take place in a variety of environments, between diversified people and through diversified media. Organised generation, processing, transfer and use of information is helpful in various fields of activities. The library and information centres play a major role in information processing, i.e., generation, collection, storage, dissemination, etc.

INFORMATION TECHNOLOGY - IMPACT ON LIS ACTIVITIES

It has been observed during the last several years that a constant change is taking place in different sectors of life under the impact of scientific and technological developments. The profession of Library and Information Science is no exception to this. Until recently the library and information professionals provided information services by using conventional methods. But the advent of the latest technologies in information science necessitated a reorientation of the library and information science environment. The computer based Information Technology (IT) has affected the library and information functions in a spectacular way. The libraries and information centres in India are also influenced by the modern technology used in information handling. Computer-commmunication based information technology (IT) has a pervading influence on information handling, thus affecting the entire field of library and Information Science which includes following activities.

- Selection and acquisition
- Processing
- Storage and maintenance
- Physical access
- Dissemination of information
- Development of information products
- Utilization of information etc.

Due to a rapid application of the new technologies in the above said areas a significant change has been observed in the working environment of library and information centres.

CHANGING SCENARIO OF LIBRARY AND INFORMATION WORK

An attempt is made in the following table to identify the changes in the activities of library and information centres.

FUNCTIONS	OLD PRACTICE	NEW PRACTICE
ACQUISITION		
Book Selection	Publisher's catalogues; Book seller's of catalogue etc; Periodical reviews; pre-publication aids;	Machine readable databases of catalogues Turnkey system (Book line)
PROCESSING		
Text Input (Primary format)	Oral presentation writing, typing	Word processing; Optical scanning with the help of computer
Cataloguing (Bibliographic descriptions	Typed catalogue, Pringted catalogue etc.	Machine readable catalogues; on-line processing of catalogues Master card entry with generated indexes
STORAGE		
Material	Cards; microform; printed material	Magnetic tapes, discs, drum, winchester, etc.; optical storage media; holographic storage media; etc.
Storage media	Card cabinets; Book shelves; cabinets; Microform storage device etc.,	Storage cabinets for Magnetic storage media: Tapes, Discs, Drum, wire, Winchester, etc.: Optical storage, Holographic Memories etc.
INFORMATION RETRIEVAL & BROWSING		
Mechanisms to manipulate, scan and search	Browsing - single shelf browsing, catalogue browsing	Multiple browsing On-line browsing of computerised databases
	Document retrieval ; Informtion on documents;	Data retrieval ; Fact retrieval; Knowledge retrieval; Information retrieval;
SDI	In-house (manually)	On-line

TRANSLATION	Manual	Machine
ACCESS	Limited Access (Local/regional); Limited source;	Wider access (global access); Teleaccess: electronic access;
INFORMATION PRODUCTS DEVELOPMENT	Local documentation lists; Union catalogues; Printed bibliographies;	International documentation lists; On-line bibliographies;
MULTIPLICATION	Typed Printed Near Printing	Instant - Multiplication Fascimile Production
COMMUNICATION	Personal Travel; Oral (man to man); Letters; Mail; Telephone	Man to machine; Telex, Teletax, CATV; Electronic Mail; Teleconferencing; Satellite communications; computer network, etc.

KNOWLEDGE AND SKILL REQUIREMENTS

New technology oriented library and information functions call for a new technology oriented and skilled LIS personnel. Therefore, more stress is to be given on the development of appropriate manpower in LIS field. The following are some of the identified areas which may be added in the teaching curricula for LIS personnel.

1. Computer Awareness : Knowledge of computer hardware and software;
2. Programming Abilities : Ability to use and develop software;
3. Exploitation of databases through the knowledge of:
    a) Indexing policies and procedures
    b) Vocabularies used in database
    c) Data structuring
    d) Query language
    e) Searching techniques and strategies
    f) Methods for optimizing interaction with potential users;
4. Creation of databases;
5. Indexing language;
6. Development of profiles i.e., user, document etc.;
7. Track user needs and behaviour;
8. Design and development of user friendly systems;
9. Telecommunication Technology;
10. Design and development of expert systems;
11. Computer teaching and research; etc.

The Above requirements for LIS personnel make it essential to restructure the LIS curriculum by giving greater emphasis on new information technology utilization.

DEVELOPMENT OF FACULTY AND TEACHING METHODS

It is evident that the scope of a curriculum for manpower development in the LIS field is very vast. An unprecedented speed of changes occuring in LIS activities, make it imperative to modify/suplement the training of faculty and the existing facilities in the library and information science training programmes. The following proposals for improving the faculty and facilities in training programmes will help to a great extent to achieve the goals of manpower development process :

a). Recruitment of expertise in communication and computer technology.

b) Establishment of communication and computer technology laboratories.

c) Establishment of audio visual laboratories

d) Availability of on-line facilities.

e). Use of audio-visual and other modern aids in teaching.

f). Exposure to information technology oriented libraries and information centres.

g). Development of multi-disciplinary faculty.

h). Development of an R&D education programme in LIS.

CONCLUSION

There appears to be a continuously growing number of innovations in the field of computer communications (information technology) which can be applied to the library and information work, for speedy, accurate and exhaustive information processing and its retrieval. It is therefore, imperative that LIS personnel should be well conversant with the new technologies and their application in information science. The LIS training curriculum, therefore, needs to re-define its objectives and improve the methods to achieve them subsequently.

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RANKING OF PERIODICALS IN THE FIELD OF SOIL SCIENCE

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The present study analyses 4361 citations appearing in 22 Ph.D. theses in soil science received by Rajendra Agricultural University, Pusa, Bihar, during the years 1980-81 to 1987-88; attempts to identify the principal forms of literature used; prepares a ranked list of 38 most cited journals representing 84.40% of the total citations out of the 261 titles cited, provides the geographical distribution of the journals in the ranked list and the chronological distribution of all citations. Source analysis reveals that journals are the main source of information.

INTRODUCTION

The exponential growth rate of periodicals and their cost has affected the libraries very much. Confronting the vast demand of the researchers to keep themselves aware of the latest developments in their field of specialization the librarians, with limited resources at their disposal, are finding it increasingly difficult to make an optimum selection from among the journals available in any field.

According to a recent estimate 72 billion pieces of information are produced each year. Presently, in the field of science and technology alone, over 60,000 periodicals are published and approximately 1,000 new periodicals are added to the existing number of periodicals each year. Over 3 million articles appear in periodicals alone[1]. The contribution in agricultural science is also fairly high, around 250 thousand papers are normally published every year in agriculture and related fields which means around one thousand research papers per working day [2].

The constant price rise of priodicals has become a stumbling-block in the acquisition of all the journals related to a specific subject field. According to the Annual Survey of Periodicals Prices by Blackwells for 1983, there has been an overall increase of 10.3% on 1982 prices. Analysing the prices by country, USA and Canada had a 13.7% increase, UK 10.9% and other countries 4.1 % [3]. In such a situation, when the special libraries are fighting hard with the growth of periodical literature and their steadily increasing cost to keep themselves up-to-date, the compilation of literature and ranking of journals with the help of citation analysis will serve a useful guide for the selection of the most useful titles.

Considering the output of Indian scientific literature, agriculture ranks second only to medicine [4]. However, no bibliometric studies have been carried out in the area of soil science so far. Hence, keeping in view the importance of this subject in the field of agricultural science, the bibliographies appearing in the Ph.D. thesis submitted to the department of soil science have been studied.

OBJECTIVES

The main objective of this study is to prepare a list of titles of journals in the field of soil science, ranked in the order of their frequency of citations, and to identify the main sources of citations. Moreover, it provides the quantitative analysis of periodical and non-periodical citations, countrywise distribution of the first 38 journals of the present list, and the span of time covered with regard to the literature studied. The ranked list of journals is generally prepared with the aim of helping the librarians to some extent in selection and acquisition of the most useful journals in the field [5] so as to enable scientists to get useful information in their area of research.

MATERIALS AND METHODS

A total of 22 theses submitted to the Department of Soil Science in the Rajendera Agricultural University, Bihar, during the years 1980-81 to 1987-88 for the award of Ph.D. degree were taken as source material for the present study. All the citations which appeared in the form of bibliography at the end of each thesis were recorded on 5" X 3" slips. In all, there were 4361 citations, which were compiled and analysed (Table 1). These were divided into two main groups: non-periodical publications and periodical publications. Non-periodical publications consist of books, Government publications and theses. Periodicals comprise journals, bulletins, transactions, proceedings (Seminar/Conference) or similar works which appear regularly and continuously in a numbered sequence. However, newspapers and annuals are excluded [6]. Out of the 4361 citations 794 were from non-periodical publications (Table-2) and 3567 were from periodical publications (Table-3). Further, the periodical publications were again divided into 3 main groups i.e. journals,bulletins and proceedings. Out of the total 3567 periodical 3161 (88.6% of the total periodical citations) were from journals alone. For determining the country of origin and year of publication of the journals the Ulrich's International Periodical Directory (26th ed., 1987) and World List of Scientific Periodicals, Ed.4, 1964 were consulted. The current issues of the journals were also consulted for this purpose. Then, by counting the citations of journals and arranging them in decreasing order of citations, the ranked list of journals was prepared (Table 4).

SOURCES OF CITATIONS

As given in Table 1, a total of 4361 citations were collected from 22 Ph.D. theses, giving an average of 198 citations per thesis. It was found that the main sources of citations were journals, Government publications, books, proceedings, bulletins and theses. It is evident from Table 1 with journals contributing the highest number of citations (72.5%), followed by Government publications (8.7%) and books (6.7%). The remaining sources were responsible for 12.1% citations only.

Table 1

Sources of citations

Sl.No.	Forms of literature	No of citations	Percentage
1.	Journals	3161	72.5
2.	Govt. Publications	379	8.7
3.	Books	292	6.7
4.	Proceedings	239	5.5
5.	Bulletins	167	3.8
6.	Theses/Dissertations	123	2.8
	Total	4361	100.00

CITATIONS TO NON-PERIODICAL PUBLICATIONS

As observed from Table 2 a large number of references cited from non-periodicals were from Government publications, which accounted for 47.7% of the total non-periodical citations followed by books and theses (36.8% and 15.5% respectively).

Table 2

Citations from Non-periodicals

Sl.	Documents	No. of referrences cited	Percentage	Overallno. Percentage
1.	Govt.Publications	379	47.7	8.7
2.	Books	292	36.8	6.7
3.	Theses	123	15.5	2.8
	Total	794	100.00	18.2

CITATIONS TO PERIODICAL PUBLICATIONS

On the basis of analysis it was found that researchers used journals in a greater proportion than any other periodical publications. Table 3 reveals that out of 3567 citations to periodical publications, journals scored the highest, i.e., 88.6% followed by proceedings and bulletins with the citation percentage of 6.7% and 4.7% respectively. The high percentage of journal citations reveals the degree of importance of journal literataure to researchers.

Table - 3

Citations to Periodical Publications

Sl. no.	Documents	No. of references cited	Percentage	Overall percentage
1.	Journals	3161	88.6	72.5
2.	Proceedings	239	6.7	5.5
3.	Bulletins	167	4.7	3.8
	Total	3567	100.0	81.8

RANKING OF JOURNALS

One of the primary objectives of the study is to identify the journals most frequently used by researchers in the field of soil science. Accordingly, a ranked list of first 38 jounals with a minimum of 10 citations each are given in table 4 with full details. These journals are arranged in decreasing order of citations received by them and alphabetically in case of identical number of citations. The rest of the journals (223) are given at the end as a single group in order to avoid unduly long list.

Table 4

Rank list of highly cited journals

Sl. no.	Rank no.	Name of the Jl	Yr.of foundation	Country of origin	No.of citations	%	Cumul. citations	Cum.%
1	1	J Indian Soc Soil Sci	1953	India	714	22.59	714	22.59
2	2	Soil Sci Soc Am J	1936	USA	382	12.08	1096	34.67
3	3	Soil Sci	1916	USA	266	8.42	1362	43.09
4	4	Pl Soil	1949	Nethrl.	238	7.53	1600	50.62
5	5	Indian J Agric Sci	1931	India	142	4.49	1742	55.11
6	6	J Soil Sci	1950	UK	102	3.23	1844	58.34
7	7	Agric J	1911	India	64	2.02	1908	60.36
8	8	Agron J	1909	USA	59	1.88	1967	62.24
9	9	Firt News	1956	India	58	1.83	2025	64.07
10	9	Pl Physiol	1926	USA	58	1.83	2083	65.90
11	10	J Envir Quality	1972	USA	57	1.80	2140	67.70
12	11	J Agric Sci	1905	USA	47	1.49	2187	69.19
13	12	Indian J Agron	1956	India	42	1.33	2229	70.52
14	13	Indian Fmg	1940	India	33	1.04	2262	71.56
15	14	Geoderma	1967	Nethrl.	32	1.01	2294	72.57
16	15	Soils Fert	1938	UK	27	0.85	2321	73.42
17	16	Soil Sci Pl Nutr	1955	Japan	25	0.79	2346	74.21
18	16	J Nucl Agric Biol	1972	India	25	0.79	2371	75.00
19	17	Can J Soil Sci	1921	Canada	23	0.73	2394	75.73
20	18	Curr Sci	1932	India	19	0.60	2413	76.33
21	18	Proc Indian Nat Sci Acad	1935	India	19	0.60	2432	76.93
22	19	Indian J Agric Res	1967	India	18	0.57	2450	77.50
23	19	Aust J Soils Res	1963	Aust.	18	0.57	2468	78.07
24	20	J Econ Ent	1908	USA	16	0.51	2484	78.58
25	20	Nature	1969	UK	16	0.51	2500	79.09
26	20	J Sci Soil Manure, Tokyo	1930	Japan	16	0.51	2516	79.60
27	21	Agrochimica	1957	Italy	15	0.47	2531	80.07
28	21	Indian J Agric Chem	1968	India	15	0.47	2546	80.54
29	21	J Pl Nutr Soil Sci	1922	W.Ger.	15	0.47	2561	81.01
30	21	J Res PAU	1964	India	15	0.47	2576	81.49

31	22	Fert Tech	1964	India	13	0.41	2589	81.89
32	23	Curr Agric	1977	India	12	0.38	2601	82.27
33	23	Fd Fmg Agric	1968	India	12	0.38	2613	82.65
34	23	Ranchi Univ J Agri Res	1966	India	12	0.38	2625	83.03
35	24	Soviet Soil Sci	1958	USA	11	0.35	2636	83.38
36	24	Proc Bihar Acad Agric Sci	1953	India	11	0.35	2647	83.73
37	24	Proc Nat Acad Sci India	1931	India	11	0.35	2658	84.08
38	25	Oryza	1961	India	10	0.32	2668	84.40
39		223 Titles having less than 10 citations			493	15.60	3161	100.00

From table 4 it is observed that 60.36% references were cited from the first 7 titles and the next 31 titles accounted for another 24.04 %. In this way, these 38 journals in the rank list represented about 84.40% of the total journals citations, whereas the remaining 223 titles have contributed about 15.60% of the journal citations.

Table 5

Geographical distribution of 38 highly cited journals

Sl no	Country	No of Journals covered	% of Journals	No. of citations shared	% of citations
1	India	19	7.28	1245	39.39
2	USA	8	3.07	896	28.34
3	UK	3	1.15	145	4.59
4	Netherlands	2	0.77	270	8.54
5	Japan	2	0.77	41	1.30
6	Canada	1	0.38	23	0.73
7	Australia	1	0.38	18	0.57
8	Italy	1	0.38	15	0.47
9	West Germany	1	0.38	15	0.47
	Total	38	14.56	2668	84.40
10	Remaining titles	223	85.44	493	15.60
	Total	261	100.00	3161	100.00

COUNTRYWISE DISTRIBUTION OF THE JOURNALS

Table 5 gives the geographical scattering of 38 most cited journals which covered 2668 citations (84.40%) out of 3161. It is clear from the table that most of these journals were published from India (7.28%) followed by USA (3.07%), UK (1.15%), Netherlands (0.77%) and Japan (0.77%) whereas each one of the four countries Canada, Australia, Italy and West Germany was responsible for 0.38% of journal citation. From the above table it is clear that researchers in the field of soil science in the country depend mostly on Indian journals.

CHRONOLOGICAL DISTRIBUTION OF CITATIONS

Table-6 presents the scattering of all references chronologically. The period of citations was divided into decennium. The table shows that the researchers have used various types of literature published during the period 1971 to 1980 as much as of 1807 out of the total 4361 citations. If the total period is divided into two broad parts, it is found that only 314 citations were from the literature published during the early period of 1900-1959, whereas 4047 citations were from literature published during the next 38 years period (1951 to 1988). It clearly indicates a phenomenal growth in the publication of scientific literature after 1950 and the trend of citing the most recent literature in the field.

Table 6

Distribution of citations according to their period of publication

Span of	Types of Literature cited						Total
Period	Non-periodical Publications			Periodical Publications			
	Books	Govt. pub.	Theses	Journals	Bulletins	Proceedings	
Early 1900	1	-	-	2	-	-	3
1901-10	1	2	-	-	-	-	3
1911-20	-	4	-	5	-	-	9
1921-30	7	3	1	13	-	-	24
1931-40	8	21	1	67	8	4	109
1941-50	24	16	1	118	6	1	166
1951-60	61	41	6	305	20	18	451
1961-70	95	95	31	756	39	40	1056
1971-80	83	157	38	1327	72	130	1807
1981-88	12	40	45	568	22	46	733
Grand Total	292	379	123	3161	167	239	4361

CONCLUSION

The study conducted on the basis of the citation analysis is confined to the Ph.D. Theses from the Department of Soil Science. It was observed that the major sources of information are journals (72.5%) followed by Government publications (8.7%). The remaining sources such as books, proceedings, bulletins and theses account together for 18.8% citations only.

A ranked list of journals is prepared which can be used by the department of Soil Science as the base for selecting journals for subscription . On one hand the list will serve as a guide to the researcher to pick out the journals most relevant in his area of research and on the other and it will help the documentalist engaged in circulation of contents to mark them to potential readers. The ranking of journals will also help the librarian in regular screening of library materials.

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CREATION OF A COMPUTERIZED DATABANK ON CHEMICAL SAFETY AT INDUSTRIAL TOXICOLOGY RESEARCH CENTRE

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In matters related to identification of chemical risks in occupational and community environment, to develop capabilities for avoiding of chemical accidents and to formulate regulatory guidelines, there is a constant need of ready availability of chemical safety data. Towards this purpose ITRC has created a computerized databank to serve as an efficient source of storage and retrieval. The details of this programme are presented.

INTRODUCTION

A dramatic change in man's outlook on life that has taken place in recent years is his growing awareness of the risks he encounters in daily experiences: radiation hazards, medicinal side effects, exposure to toxic chemicals, food contaminants and occupational diseases. This makes it an essential endeavour to collect, compile and disseminate authentic information on the safe use of chemicals by manufacturers, users, government and general public. There are no totally safe chemcials, but only safe ways of manufacturing, handling and utilising them. Safety measures should, therefore, form an itegral part of any operation involving chemicals, starting from research and development to disposal. Awareness has to be created on the safe use of chemicals and information provided for preventing and managing chemical hazards. Chemical safety does not mean the absence of any risk whatsoever, but risk management. However, if the toxicity of chemicals is for the most part unknown, its risk appraisal cannot be carried out in an adequate manner. Toxicity data generated experimentally or taken from databases can help provide an immediate answer to such problems. ITRC over the years has been contributing actively in this regard. It is here that computer technology assumes significance in toxicology. The large resources of information currently and potentially available can be utilized more efficiently and in a more meaningful form for the solution of specific problems.

A list of different types of hazardous industrial chemicals was prepared in a categorical manner to start with, covering over 500 chemicals. Complete toxicology data profiles on 228 chemicals (Appendix 1) manufactured or used in India were compiled by ITRC scientists. The data collected from a number of books, reviews, research papers and microfisches were fed in a computer, updated, expanded and retrieved after developing a well conceived format. Using dBASE III PLUS and Wordstar softwares all information regarding the 228 chemicals was computerized (Appendix 1). Laser prints were obtained from the stored information and the hard copies were printed by photo-offset printing machines [1]. This essentially formed the computerized databank in ITRC on toxic chemicals.

The development of a computerized databank on industrial chemicals and the use of computer for storing and processing the information on their safety have been described here. The ultimate goal is provision of specific and selected information exactly as the user needs it, thus freeing him from an overload of unnecessary information and searching exercises. The functional logistics of the creation and working of this databank is described below.

FILE STRUCTURE OF DATABANK

The following fields were created in order to computerize all the properties of a chemical using dBASE III PLUS:

1. NAME
2. SYN
3. PP
4. CP
5. AM
6. USE
7. HAZ
8. OCCR
9. OCCSP

10. ENVR
11. ENVQS
12. PENV
13. TOXDATA
14. DIGT
15. PREV
16. DM
17. PACKL
18. STOR
19. TRANS
20. INDC
21. NOTE
22. REF

NAME is a character field which contains the name of the chemical. All others are memo fields.

SYN - synonyms, NIOSH #, chemical abstract registry number, molecular formula and molecular weight.

PP	-	physical properties
CP	-	chemical properties
AM	-	analytical methods
USE	-	uses of that particular chemical
HAZ	-	hazards from fire, explosion, etc. and also the hazard rating of the chemical
OCCR	-	occupational risk i.e. epidemiological data, diseases and accidents
OCCSP	-	occupational safety parameters consisting of personal protective equipments, threshold limit values, etc.
ENVR	-	environmental risk to humans, animals, and crops
ENVQS	-	environmental quality standards
PENV	-	persistence of the chemical in the environment, its metabolism and degradation
TOXDATA	-	toxicity data i.e. threshold limit values, routes of exposure of the chemical system, organs affected and the symptoms caused by it, and the first aid that should be provided
DIGT	-	diagnostic tests and treatment required and the special high risk groups
PREV	-	ways of prevention and precaution from fire, explosion, etc.
DM	-	disaster management
PACKL	-	packaging and labelling of the chemical
STOR	-	ways of storing the chemical
TRANS	-	safe transportation of the chemical
INDC	-	various Indian (Bureau of Indian Standards) Standards and production statistics of the chemical
NOTE	-	any special remarks regarding the chemical
REF	-	references from where data was collected

An application programme was developed (appendix 2) to get a complete printout of all the chemicals or all the properties of a particular chemical the samples of which are given as Appendix 1 and Appendix 3.

APPLICATION OF THE DATABANK

The above format has several advantages while retrieving the information and supplying it to users as required. For example, the whole information, or any part of it, (a particular chemical), information on parameters or specific information on a parameter like toxicity, ways and means of prevention, etc. can be retrieved. A usual problem encountered in most toxicological data search is the practice of using a large number of trade names and synonyms to avoid lengthy retrieval lists. This is avoided in the present format. For the compilation of information, care has been taken to include all aspects - unlike all other toxicity data handbooks available. None of the other chemical safety data sheets gives such complete information.

CONCLUSION

The above programme leaves an ample scope for additions, alterations and constant updating as and when the need arises or new information becomes available. In many cases some of the data elements defined in the format, are not presently available in literature, and also many regulatory agencies constantly review and change the standard limits. In order to keep the databank uptodate, a constent flow of editing, updating and adding is carried out with an excellent library backup in terms of books, journals, abstracting services, microfisches, reports and documents from regulatory agencies, interaction through IRPTC, IARC, IPCS, UNEP, etc. and through the liaison with MEDLARS and other information services. It is also underway to expand the present databank to all the 500 major chemicals used in the country in large amounts, as given in the list prepared by the Department of Environment and Forests. Based on the databank, it has been possible to respond to several toxicological queries from industries, government departments and the scientific community.

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Appendix 1

TDS NO.

1. Acetaldehyde
2. acetic acid
3. Acetic anhydride
4. Acetone
5. Acetonitrile
6. Acetophenon
7. Acetylene
8. Acrolein
9. Acrylamide
10. Acrylonitrile
11. Allyl alcohol
12. Allyl chloride
13. Ammonia
14. Ammonium nitrate
15. Anthracene
16. Aniline
17. Arsenic
18. Benzene
19. Benzoyl chloride
20. Bromine
21. 1,3 Butadiene
22. 1-Butene
23. n.Butyl acetate
24. Comphor
25. Caprolactam
26. Carbon disulfide
27. Carbon monoxide
28. Carbon tetrachloride
29. Chloral
30. Chlorine
31. Chlorobenzene
32. Chloroform
33. copper sulfate
34. Cyclohexane
35. Diazomethane
36. Diethyl Phthalate
37. Dimethyl amine
38. Dimethyl formamide
39. Dimethyl sulfate
40. Dimethyl sulfoxide
41. 2,4-Dinitrophenol
42. Dioxane
43. Dodecyl benzene
44. Epichlorohydrin
45. Ethyl acetate
46. Ethyl bromide
47. Ethyl butyl ether
48. Ethylene dichloride
49. Ethylene glycol
50. Ethylene glycol monomethyl ether acetate
51. Ethylene oxide

Appendix 2

```
USE CHEMI
SET TALK OFF
SETT MEMOWIDTH TO 60
STORE 0 TO CHOICE
STORE “Y” TO ANSW
DO WHILE ANSW = “Y”
CLEAR
@ 5,20 SAY “MAIN MENU”
@ 6,20 SAY REPLICATE (“*”,9)
@ 8,10 SAY “1. TOTAL CHEMICAL PROPERTIES OF A CHEMICAL”
@ 10,10 SAY “2. PARTICULAR CHEMICAL PROPERTY OF A CHEMICAL”
@ 12,10 SAY “3. EXIT”
@ 14,10 SAY “ENTER YOUR CHOICE (1/2/3)” GET CHOICE PICTURE “9”
READ
IF CHOICE = 1
STORE “Y” TO REPLY
STORE “                              “ TO MNAME
DO WHIILE REPLY =”Y”
CLEAR
@ 12,10 SAY “ENTER THE NAME OF CHEMICAL” GET MNAME
READ
GO TOP
LOCATE FOR NAME = MNAME
SET PRINT ON
? SYN
?
? PP
?
? CP
?
? AM
?
? USE
?
? HAZ
?
? OCCR
?
? OCCSP
?
? ENVR
?
? ENVQS
?
? PENV
?
? TOXDATA
?
? DIGT
?
? PREV
?
? DM
?
? PACKL
?
? STOR
?
? TRANS
?
? INDC
?
? NOTE
?
? REF
CLEAR
SET PRINT OFF
@ 4,6 SAY “DO YOU WANT OT CONTINUE (Y/N)” GET REPLY
READ
ENDDO
ELSE
CLEAR
IF CHOICE = 2
GO TOP
STORE “Y” TO ANS
DO WHILE ANS =”Y”
STORE “                              “ TO MNAME
STORE O TO PROPCLEAR
@ 6,4 SAY “ENTER THE NAME OF CHEMICAL” GET MNAME
@ 8,4 SAY “ENTER THE PROPERTY OF CHEMICAL” GET PROP
READ
LOCATE FOR NAME = MNAME
SET PRINT ON
DO CASE
CASE PROP = 1
? SYN
CASE PROP = 2
        ? PP
CASE PROP = 3
        ? CP
CASE PROP = 4
        ? AM
CASE PROP = 5
? USE
CASE PROP = 6
        ? HAZ
CASE PROP = 7
        ? OCCR
CASE PROP = 8
        ? OCCSP
        CASE PROP = 9
? ENVR
        CASE PROP = 10
```

(ii)

```
? ENVQS
CASE PROP = 11
? PENV
CASE PROP = 12
? TOXDATA
CASE PROP = 13
? DIGT
CASE PROP = 14
? PREV
CASE PROP = 15
? DM
CASE PROP = 16
? PACKL
CASE PROP = 17
? STOR
CASE PROP = 18
? TRANS
CASE PROP = 19
? INDC
CASE PROP = 20
? NOTE
CASE PROP = 21
? REF
ENDCASE
CLEAR
SET PRINT OFF
@ 2,4 SAY "DO YOU WANT TO CONTINUE (Y/N)" GET ANS
READ
ENDDO
ELSE
CLEAR
IF CHOICE = 3
EXIT
CLEAR
ELSE
@ 14,10 SAY "INVALID CHOICE"
@ 16,12 SAY "DO YOU WANT TO RETRY (Y/N)"

GET ANSW
READ
ENDIF
ENDIF
ENDIF
ENDDO
```

Appendix 3

BENZENE

Synonyms : Benzol; Cyclohexatriene; coal tar Naphtha; Phenyl hydride; Motor Benzol; Mineral Naphtha; Pyrobenzole; Carbon oil.

NIOSH # : C Y 1400000

CAS R N : 71432

Molecular formula : C H 6 6

Molecular weight : 78.1

Physical Properties :

Clear colourless liquid, with characteristic aromatic odour.

b.p. 80 deg. c; m.p. 5.5 deg. C; f.p. -11 deg. C; a.p. 550 deg. C; r.d. (water = 1) 0.9; r.v.d (air=1) 2.7; v.p. in mbar at 20 deg.C : 100; sol. in water g/100 ml at 20 deg.C : 0.1.; e.1 vol. % in air : 1-8

Chemical Properties :

Vapour heavier than air, distant ignition possible. slightly soluble in water. Violent exothermic reaction with oxidants; incompatible with chlorine, bromine, iron, oxygen, ozone, perchlorates, sodium oxide, sulfuric acid + permanganates, chromate. High solubility in alcohol, acetone & ether. Dangerous when exposed to heat or flame.

Analytical Methods :

absorb vapours on charcoal tube, desorb with carbon disulphide analyse by G.C.

NTIS order no. for validated analytical Method PB 262405

Uses :

Solvent for rubber, lacquers, paints, chemical industry, detergents, dyes, explosives, fumigants, insecticides, leather, linoleum, phenol, rotogravure printing. A high energy component of aviation and motor gasolines.

Hazards :

Fire : Dangerous, when exposed to heat or flame.

Explosion : Moderate; vapour-air mixture explosive.

Others : Reacts vigorously with oxidants causing fire.

HAZARD RATING : VERY DANGEROUS

Occupational Risk :

Epidemiological Data : 34.3% women & 13.3% men with chronic benzene poisoning in rubber industry in Sweden and change in blood cells in 18.6% women workers in the leather industry in Poland were reported (1). Gynaecological morbidity amongst workers in rubber industry (2,3).

Diseases : Leukemia, anemia, macrocytosis, reticulocytosis, thrombocytopenia.
accidents : 13 deaths occurred due to inhalation following convulsions, paralysis and unconsciousness in Great Britain between 1941-1959 (4). accidential ingestion of fluid containing benzene proved fatal (5).

Occupational Safety Parameters :

Personal Protective Equipments : Strict hygiene, breathing apparatus, face shield, protective clothing.

TLV : 10 ppm; STEL : 25 ppm

Environmental Risk :

Humans :

Odor perception : 3 mg/m3

fatal : 19,000 ppm 5-10 M

severe toxic effects : 1500 ppm/60 M

symptoms of illness : 500 ppm/60 M

Animals :

Grass Shrimp LC50 (96 H) : 27 ppm

Blue gill fish LD50 (24-48 H): 20 mg/L

Blue gill fish LD100 (24 h) : 34 mg/L in 2H

Toad (3-4 W after hatching) LC50 (48 H): 190 mg/L

Ecosystems:

Animal chronic exposure (adverse effects) : 3.2 mg/m3 air

Threshold odour concentration : 1.4 ppm

Toxicity Threshold (Cell Multiplication inhibition):

(ii)

bacteria (Pseudomonas putida) : 92 mg/L

green algae (Scenedesmus quardricauda) : >1400 mg/

Protozoa (Uronema parduczi chatton Lwoff) : 486 mg/ L

Environmental quality Standards :

Aquatic Toxicity Rating : TLm 96: 100-10 ppm

Ambient air of residential area : MAC : 0.8 mg/m3 (average daily)

Fisheries MAC : 0.5 mg/L
Occupational exposure recom. std: Air : CL : 10 ppm/ 60 M

Persistence in the Environment :

Estimated half life time under photochemical smog conditions in SE England : 28 H

Calculatted half life in water at 25 deg. C and 1 m depth, evaporation rate 0.144 ml/H: 4.81 H.

Biodegradation to carbon dioxide in estuarine water.

Toxixity Data :

inh-hmn TC : 400 ppm/8 Y-I : ETA

inh-hmn TC : 2100 mg/m3/4 Y-I : CARC

inh-hmn LCLo : 20,000 ppm/5 M

inh-hmn TCLo : 100 ppm : CNS

inh-hmn TCLo : 210 ppm : BLD

orl-hmn TCLo : 130 mg/Kg : CNS

inh-hmn TCLo : 100 ppm/10 Y-I : CARC

son-rbt : 15 mg/24 H open MLD

orl-dog LDo : 2,000 mg/Kg

inh-dog LCLo : 146,000 mg/m3

inh-cat LCLo : 17,0000 mg/m3

Route	Symptoms	First aid	Target organs
inh.	headache,dizziness, nausea, unconsciousness, sore throat, pulm. oedema, hallucinations	fresh air, rest, artificia resp., keep warm	resp. tract
ing.	adbominal pain.	wash mouth with water.	GIT.
cont. & abs.	redness of eyes, dryness & blisters on skin.	remove contaminated clothes, wash with water. Call a Doctor.	eyes, skin.

Diagnositic Test : Conjugative metabolites in urine, blood test, rectal temperature, neurological examination, bone marrow examination. Benzene in blood. Phenol in urine above 100 mg/L in 24 H specimen (end of shift spot samples may be used as a screening test and should not exceed 75 mg/L). chromosome aberrations in peripheral and bone marrow cells occur and may persist for a long time after cessation of exposure.

Treatment : Symptomatic. Treat as an emergency, respiratory Stimulants; NO ADRENALIN. Usual reatment for blood dyscrasias. Liver extract, transfusion, cortisone.

Special high risk groups : Pregnant women, persons with family history of blood abnormalities, liver & renal disfunctions.

Prevention :

No open flames, no sparks, no smoking, closed system, ventilation, explosion protected electrical equipment, proper earthing. Do not handle compressed gas. Weekly sampling of atmosphere, rotate exposed personnel. Determination of urinary phenol at regular intervals. Complete blood count every month, remove from exposure those with W.B.C. below 5,000 or R.B.C. below 4,000,000 on two successive examinations.

Disaster Management :

Collect leaking liquid in sealable containers. absorb spilled liquid in sand or inert absorbent, remove to safe place.

Extinguish fire with powder chemicals, alcohol foam, or carbon dioxide. Keep drums cool by spraying with water.

Packaging and LabelLing :

Unbreakable packaging.

UN : 1114

Label : flammable liquid & poision.

Storage :

Fireproof, away from oxidants.

Transport :

flammable liquid & poison label required. TREMCARD for benzene to be carried by the dirver of the vehicle.

Indian Context :

ISI Standard : IS : 534 - 1974
ISI Code of Safety : IS : 4644 - 1968
Production Statistics : 11 units

Total Production : 153000 T/Y

Notes :

Alcoholic beverages enhance toxicity. There is great individual variation in signs and symptoms of chronic benzene poisoning. Experimental MUT, CARC, TER, equivocal TUM, and NEO effects. Carcinogenic determination : human suspected. Benzene cyclohexane and other chemical components used in synthetic fibre manufacture with toluence and gasoline and lead have additive effects to toxicity.

References :

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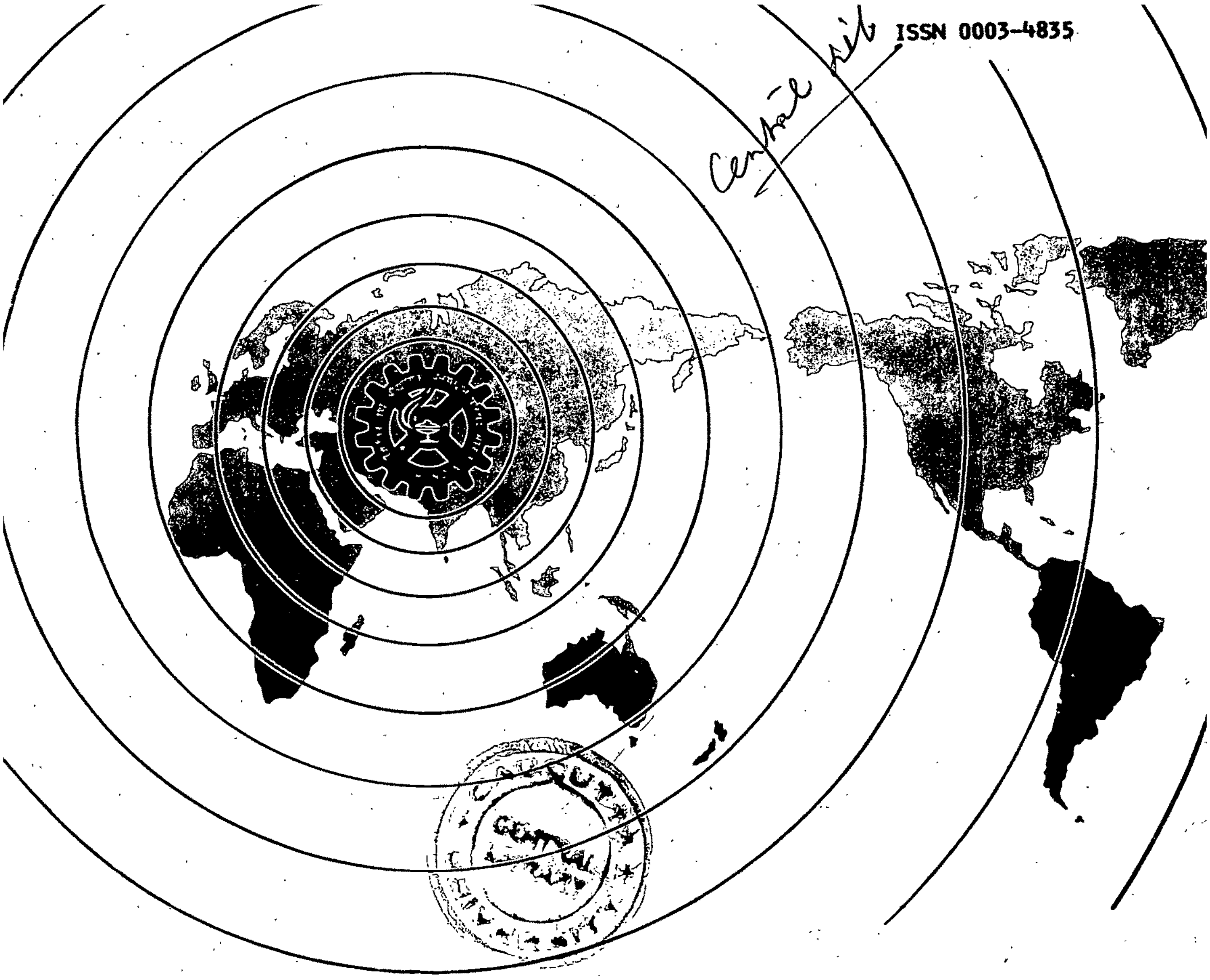

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JOB CHARACTERISTICS OF LIBRARY AND INFORMATION WORK AS SATISFIERS AND DISSATISFIERS - A SURVEY

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Data on level of satisfaction with job characteristics of library and information work was gathered through a questionnaire from professionals and semi-professionals working in university libraries in India. Analysis of the data reveals that majority of the respondents are satisfied with most of the attributes of their work, but there are differences in the perception of men and women, and seniors and juniors. Also suggests a fair deal in work pattern to fair sex; more attention to in-service training; reanalysis and redesigning of jobs for better utilization of skills and abilities; more internal motivation to the staff and improvement in quality of work performance.

INTRODUCTION

Indians have a very rich and ancient cultural heritage which euologises work. Work is worship. Gita preaches perfection of work without expectations and return, as also attainment of 'moksha' through 'karma yoga'. Yet, it is also a fact that work ethics is fast deteriorating in India. Libraries are no exception to it. Top persons at the helm of libraries complain about the situation.

Sociologists, psychologists, managers and administrators are paying increasing attention to make work more agreeable, meaningful and interesting to tap the benefits of involvement and motivation at work. And the importance of work is still the more in service oriented organizations like libraries because the major scope for their improvement in efficiency and effectiveness comes through a more effective use of human resources.

Work calls for certain attributies. In other words, there are certain job characteristics or job descriptors for performing a task. Job characteristics are known to have or thought to have a bearing on the human attributes required to carry out the job. And every profession and occupation has a framework of job oriented activities. It is known as job content. Since 1950s, researchers and theorists in management began to examine the effects of the work itself on workers' attitudes. Several studies have been made to know which of the factors of work satisfy the workers. Investigations by various authors [1], [2] and [3] suggest that some of the work attributes creating interest and satisfaction among the workers are: the use of one's skills and abilities, variety in work, responsibility, autonomy, challenge, physical fatigue, etc.

Job satisfaction of library manpower has caught attention in the western countries. Many studies have been reported in the area [4], [5], [6], and [7]. Glancing through the pages of "A Survey of research in psychology" [8] in India, one notices significant research done in the field of job satisfaction, including in the academic community. But there is not a single reference to library profession. However, some of the library professionals have carried out similar investigations in the field and reported the findings in their doctoral theses [9],[10] and [11].

If specific job characteristics are present in a job "employees will experience a positive, self generated response, when they perform well - and this internal kick will provide an incentive for continued efforts towards good performance" [12-13].

"Job characteristics study is the most popular approach to the design of work" [14] for quality of work life programmes and organization development. But hardly any literature is available which touches this aspect of library work in the Indian milieu.

OBJECTIVE

An attempt is made through a survey to know the level of satisfaction of professional and semi-professional manpower working in the university libraries in India with various characteristics of job.

POPULATION

There are 180 universities in the country [15]. The present study is based on a survey which covers 23 universities (Appendix I) of various sizes, types, ages, controlled by the central, state and union territory governments; located from Kashmir in the north to Kerala in the south, Maharashtra in the west to West Bengal in the east. 353 professionals and semi-professionals participated in it, out of whom 216 are males and 137 females; 154 seniors and 199 juniors. Non-professionals are not included to make the study homogeneous.

HYPOTHESES

Males and females form two distinct groups, so also seniors and juniors, categorised according to their professional level in the organizational structure of the university library are two distinct groups. It is postulated that:

1. The level of job satisfaction is the same for male and female professional manpower working in the university libraries in India with work.
2. The level of job satisfaction is the same for senior and junior professional manpower working in the university libraries in India with work

It may be mentioned here, that positions of assistant librarian and above are treated as senior whereas positions below assistant librarian as junior.

METHODOLOGY

The data collection instrument is a questionnaire. A direct contact method was chosen to instil a feeling of importance and to assure the respondents that the information sought was for research work only. All the professionals and semi-professionals were given the questionnaire. Out of 407 persons, 361 responded. However, 8 questionnaires were found unusable.

The questionnaire covers fifty one variables, grouped under ten dimensions; profession, work, planning and policies, working conditions, supervision and management, communication, salary, promotion, user services, and status. Most of the variables covered under dimension work, are based on the Sheffield Manpower Project : A survey of staffing requirements for librarianship and information work [16]. The specific research questions asked about work concern:

1. The in-service training in the library for doing the job.
2. The regularity and predictability (to do more or less the same work at more or less the same time in fairly regular sequence) in the work.
3. The responsibility of the job.
4. The chance to do different things from time to time/variety in the work.
5. The chance to work alone/independently on the job.
6. The chance to do something that makes use of the professional knowledge.
7. The chance to do something that makes use of subject knowledge in which graduated/post graduated.
8. The challenge of the job.
9. The chances of interruptions during the course of a day.
10. Working at unconventional timings such as morning and evening shifts, Sundays and holidays.
11. Physical requirements of the job, such as standing, noise, weight lifting, climbing up and down, strain on eyes, etc.

In-service training for performing the job, interruptions and unconventional timings are strictly speaking not the attributes of the work, but they are related to work, hence they have been covered under it.

Scoring system is based on a five point Likert type scale. Score generated from summation of the values of these variables is considered for General Satisfaction, and from those of the dimensions are considered for satisfaction with the dimension.

Correlation analysis has been done to ascertain the extent and direction of the dimensions of the job satisfaction. F test Two Way analysis of Variance is used to determine the significance of difference for accepting or rejecting the hypothesis. However, detailed analysis of satisfaction with each characteristic of the job is limited to percentage only.

ANALYSIS OF DATA

Correlation coefficient between work dimension and total job satisfaction was found significant (0.7431).

A profile of the sample indicates that academically and professionally the respondents are well qualified. 95% of them earned graduate or higher degree, 63.46% have B.Lib. Sc. or equivalent degree, 26.64% M.Lib. Sc. and 1.13% Ph.D.

Table 1 gives relative contribution of each variable of the work to the level of satisfaction. Almost two-fifths of the respondents are not satisfied with the characteristic 'in-service training', out of whom 8.5% are 'very dissatisfied' with it, while the percentage of the satisfied ones is 44. 'Regularity and predictability', and 'variety' in library work satisfy about three-fifths. But the work factor which satisfies the greatest number of persons i.e. three fourths is 'responsibility', and next in that order is 'independence'. A little over half of them are 'satisfied' with it, and 13.6% are 'very satisfied'. One-third of the population under study is not satisfied with the use of their professional and subject knowledge. A majority of the respondents have expressed positive views on

Table 1

Percentage Level of Satisfaction with Job Characteristics

Variable	Very dissatisfied	Dissatisfied	Cannot decide	Satisfied	Very satisfied
In-service training	8.5	32.01	15.86	37.39	6.24
Regularity and predictability	2.27	16.71	21.53	54.11	5.38
Responsibility	1.98	14.73	7.08	63.46	12.75
Variety	7.08	25.21	7.08	49.01	11.62
Independence	3.12	19.83	9.06	54.39	13.6
Use of professional knowledge	5.38	30.59	8.5	44.76	10.77
Use of subject knowledge	6.8	29.46	10.76	43.63	9.35
Challenge	7.08	22.66	15.87	42.27	12.18
Interruptions to work	8.21	24.65	29.46	33.15	4.53
Unconventional timing	7.65	26.35	11.9	45.89	8.21
Physical requirements	9.06	24.93	12.75	48.44	4.82

'challenge', 'unconventional timing' and 'physical requirements' of the work. But this majority is only a little above the neutral level. The case of 'interruption to work' is peculiar, 29.46% of job holders being indifferent to it, while one-fourth of them are 'dissatisfied', and another 8.21% 'very dissatisfied'.

Table 2 indicates the perception of males and females, separately, about the level of satisfaction with various attributes of their work. The percentages of females being 'very dissatisfied' and 'dissatisfied' with 'in-service training' are higher than those of the males.

'Regularity and predictability' in work satisfied 47.79% females as against 58.06% males, the difference is more than 10%. Similarly, the percentages of females 'satisfied' or 'very satisfied' with the 'responsibility' factor are less than those of the males. Males have an edge over females for the characteristic 'variety' also, 9.56% females are 'very dissafisfied' as against 19.82% of their counterparts.

Significant differences in the perception of the two groups are visible for the characteristic 'independence'. 57.14% males are 'satisfied' and 15.67% 'very satisfied', contrary to females, whose score is 50% and 10.3%, respectively. So is the case with the characteristic 'use of professional knowledge'. 38.97% females find satisfaction, here, as against 48.39% males.

The level of satisfaction with 'use of subject knowledge' is also higher among males in comparison to females. And the same is true in case of the characteristic 'challenge'.

The percentage of indifferent females is almost double than that of the males for 'interruptions to work. 'Physical requirements' of the job cause dissatisfaction to more females than males. But the reverse is true in case of 'unconventional timing'. This is the only variable for which the precentages of 'very dissatisfied' and 'dissatisfied' males are higher than those of the females.

Table 3 depicts how seniors and juniors in the university libraries feel about various job attributes.

37.82% of the seniors are 'dissatisfied' with 'in-service training' factor, as against 27.14% of the juniors. The score of the 'very dissatisfied' juniors is double than that of the seniors. A difference of almost 9% is found between 'satisfied' juniors and 'satisfied' seniors, in case of 'regularity and predictability' attribute. More juniors are found 'satisfied' with this variable than seniors. Similarly, 'responsibility' satisfies more juniors than seniors. But the score of juniors, in this case is only 4% higher than that of seniors.

Differneces in perception of the two groups under 'variety' and 'independence' factor are not much, whereas the percentages of seniors, who are 'very satisfied and 'satisfied', on account of the use of their professional and subject knowledge, are higher than those of the juniors. The difference is of 3 and 5 per cent respectively in the former, while 6 and 9 per cent respectively, in the latter.

A significant difference is also observed in the attitude of seniors and juniors towards 'challenge'. 17.31% seniors are 'very satisfied' with it against 8.04% juniors, and 48.72% of the former are 'satisfied' as against 36.69% of the latter.

A difference in the feelings of the two groups is also apparent with regard to 'interruptions to work'. Only two-fifths of the seniors seem to be satisfied, as against more than one-third of the juniors.

The percentage of juniors who are 'very satisfied' with respect to 'unconventional timing', is almost double than that of the seniors. However, not much difference is found in the opinion of the two groups for 'physical requirements'.

Table 2

Level of Satisfaction of Males and Females with Job Characteristics

Variable	Very dissatisfied	Dissatisfied	Cannot decide	Satisfied	Very satisfied
In-service training	M 7.83	30.88	16.13	37.33	7.83
	F 9.56	33.82	15.44	37.5	3.68
Regularity and predictability	M 3.23	14.75	18.43	58.06	5.53
	F 0.74	19.85	26.47	47.79	5.15
Responsibility	M 0.92	11.98	5.07	66.36	15.67
	F 3.68	19.12	10.29	58.82	8.09
Variety	M 5.53	19.82	8.75	53.92	11.98
	F 9.56	33.82	4.41	41.18	11.03
Independence	M 2.31	18.89	5.99	57.14	15.67
	F 4.41	21.32	13.97	50	10.3
Use of profesional knowledge	M 5.53	27.19	7.83	48.39	11.06
	F 5.15	36.03	9.55	38.97	10.3
Use of subject knowledge	M 5.56	28.24	8.8	45.83	11.57
	F 8.82	31.62	13.97	40.44	5.15
Challenge	M 6.45	17.05	14.75	47.47	14.28
	F 8.09	31.62	17.65	33.82	8.82
Interruptions to work	M 8.29	26.73	21.66	39.63	3.69
	F 8.09	21.32	41.91	22.8	5.88
Unconventional timing	M 10.14	28.57	8.76	45.16	7.37
	F 3.68	22.79	16.91	47.06	9.56
Physical requirements	M 5.53	24.88	11.52	54.38	3.69
	F 14.7	25	14.71	38.97	6.62

Table 3

Percentage Level of Satisfaction of Seniors and Juniors with Job Characteristics

Variable	Very dis-satisfied	Dissatis-fied	Cannot decide	Satis-fied	Very Satis-fied
In-service training	S 5.77 J 10.55	37.82 27.14	17.3 15.58	35.26 38.69	3.85 8.04
Regularity and predictability	S 2.56 J 2.01	20.51 13.57	22.44 21.61	48.72 57.79	5.77 5.02
Responsibility	S 3.85 J .5	16.03 13.57	6.41 8.54	60.89 64.82	12.82 12.57
Variety	S 8.33 J 6.03	23.72 26.13	7.05 8.04	47.44 49.75	13.46 10.05
Independence	S 3.25 J 3.02	18.83 20.6	7.14 10.55	53.9 54.77	16.88 11.06
Use of profess-ional knowledge	S 5.13 J 5.53	28.85 31.66	6.41 11.06	46.15 43.22	13.46 8.53
Use of subject knowledge	S 6.41 J 7.04	25 32.66	7.69 14.07	46.79 40.7	14.1 5.53
Challenge	S 7.69 J 6.53	15.38 28.14	10.9 20.6	48.79 36.69	17.31 8.04
Interruptions to work	S 8.33 J 8.03	20.51 27.64	30.77 29.15	37.82 29.15	2.57 6.03
Unconventional timing	S 6.41 J 8.54	25 27.14	16.67 9.04	46.15 45.23	5.77 10.05
Physical requirements	S 8.33 J 9.55	23.72 25.63	14.74 12.06	47.44 48.74	5.77 4.02

Table 4 shows mean scores of work satisfaction of the groups

Table 4

Mean Scores of Work Satisfaction

Males	Females	Seniors	Juniors	Total
37.08	34.86	36.79	35.79	36.22

As is evident from the above table, males derive greater level of satisfaction from their work than females; and seniors higher than juniors.

VALIDITY OF HYPOTHESIS

For finding out the significane of difference with regard to work, between groups, F Test Two Way Analysis of Variance has been done (Table 5).

F ratio 'between groups' reveals that there is a significant difference among the groups at p <.05 level.

F ratio 'between sexes' is significant at p <.01 level. The findings, therefore, reject the null hypothesis of equality of job satisfaction among males and females. F ratios of 'professional levels' and 'interaction - sexes and professional level' are not significant at p <.05 levels. Hence, the second hypothesis of equality of job satisfaction among seniors and juniors does not stand disproved.

Table 5

Summary Table of Adjusted Two Way Analysis of Variance

Sources of variation	Degrees of freedom	Sum of Squares	Mean Square	Variance ratio F
Between groups	4-1=3	576.92	192.3	4.258*
Between sexes	2-1=1'	372.368	372.368	8.245**
Between professional level	2-1=1'	47.318	47.318	1.0476
Interaction - sexes and professionallevel	3-1-1=1'	118.289	118.289	2.619 (n.s)
Correction for disproportionate numbers	-	38.962		
Within groups (Error SS)	353-1-3 = 349	15762.43	45.164	
Total sum of squares	353-1 = 352	16339.35		

Note : A prime (') placed on degrees of freedom for sexes, professional levels and interaction denotes that their SS needed adjustment due to disproportionate numbers.

F ratios were checked at the .05 and .01

* p.< .05

** p.< .01

DISCUSSION

An important precondition of work satisfaction is that the individual finds the work itself personally interesting and meaningful [17]. There are also individual differences in adaptation to work. Library work makes certain intellectual, social and physical demands. A person may like a job characteristic of his work, while the other may not. Job characteristics in these terms represent the type of behavior called for the work, to which the library personnel has to adapt.

The library personnel, like other professionals, gets general and professional education, before joining the profession. But practices and procedures vary from library to library and many practices are learnt on the job, hence the need for in-service training. It appears from the findings of this investigation, that this aspect of the job is not given proper justice, as two-fifths of the respondents are found dissatisfied/very dissatisfied with it.

As the job holders become familiar with the jobs and learn the responses required in the repetitive tasks, there comes 'regularity and predictability' in the work. Such work, in due course, requires less effort, time and intelligence. The university libraries in India are mostly modelled on conventional lines - the jobs to be done are more or less defined. The study suggests that a majority of the respondents are favourably adjusted to this characteristic. It can also be attributed to the fact that three-fourth of the sample under study had worked for more than 10 years in the profession.

The responsibility of work gives a feeling of importance while performing a task. The level of satisfactiion is found to be the highest for the characteristic 'responsibility'.

According to Porter et al [18], variety in work may serve to increase activation level. Library professionals perceive that their work provides them this element, and three-fifths of the respondents are satisfied with this attribute, in their work.

Independence makes one feel that one's efforts tend to be the cause of failure or success on the job. Almost two-thirds of the manpower are satisfied with this factor in the work.

Every profession requires distinct abilities, capacities and knowledge to perform that work. Library and information work needs two types of knowledge - professional and subject. It is a sad reflection, that about one-third of the respondents perceive that library work does not make proper use of their specialised knowledge. Depending on how work is arranged, it appears that some of the jobs assigned to the professionals, do not provide sufficient opportunities to a segment of the workforce for skill utilisation.

Challenge in work basically involves the use of one's conceptual faculty. If the challenge of the work is sufficiently great and is accepted by the employees, they should be both interested and involved in the job [19]. The library work satisfies this stimulus in a marginal majority of the respondents.

Library work has some peculiarities of its own. It is service oriented, therefore, interruptions because of the queries and unconventional timings are bound to be there. This study suggests that a majority of the professionals have adjusted to the unconventional timings and physical requirements of their job.

Turning to groups, this investigation discloses significant difference in the percerptions of males and females. Job satisfaction is the result of the interaction between the person and the work. And a large number of researach studies indicate that there are differences in the level of job satisfaction among various groups. In the library field, there are contradictory findings about level of satisfaction among men and women. Wabha [20] and Rockman [21] report that there are differences in the level of satisfaction of these two. Contrary to that, studies by George D'Elia [22] and Sergean [23] do not support it. Actually, this investigation, which is a part of a study of job satisfaction of ten dimensions, found statistically significant differences in the perception of the two group only for dimension 'work'. Additionally, males tend to derive more satisfaction than females, from library work, in the Indian university environment, as aforementioned.

Unlike U.S.A. and U.K., in India, library profession is male dominated. But as in these and other western countries, so also in India, there is sex discrimination in the library profession, and men dominate the pinnacle of the profession and organisations, while the women form the base (as documented by numerous studies) [24]. Only one female in the university libraries covered by this study was holding the top position, and that too in an officiating capacity. Not only that, a senior man was more likely to be associated with planning and policy making duties ,than a senior woman. As it was found by the survey only 8.16% of the senior fair sex was assigned such work, as against 26.675 of senior males. Significant differences in percentages of the level of satisfaction among males and females for the factors 'responsibility', 'regularity and predictability', 'variety', 'chance to make use of professional and subject knowldge', 'challenge' and 'interruptions' suggest that females perceive themselves discriminated in work in the university library milieu.

Studies by Friedmann and Havighurst [25] and Morse and Weiss [26] suggest that there is significant difference in the nature of work at different job levels. The employees at higher level jobs are more likely to get a better deal in work selection than employees at jobs on lower level. This investigation also supports their results, though the differences are not statistically significant. Seniors, being supervisors or managers in many cases, have to make decisions about other people, resources, etc., their activities are more varied, fragmented and brief. Therefore, independence and challenge involved in their work provide better chances of satisfaction for them.

Chance to use professional knowledge and subject knowledge also cause dissatisfaction more to juniors than to seniors. This is also understandable. Juniors hold low level jobs, wherein the use of their skills may not be to the extent they desire or have the capability to do. Additionally, some of the juniors are well qualified, or rather over-qualified, for their respective positions as is indicated by their profiles. It is more likely that they feel that their knowledge is under - utilised, hence dissatisfaction.

Only a little over one-third of the seniors are found satisfied with in-service training. Seniors have to supervise the work of juniors. In the absence of sufficient in-house training, it is likely that they face difficulty in taking work from juniors. Secondly, in-service training in the university libraries in India is usually not available for higher jobs. This may also cause more dissatisfaction among them, in comparison to juniors.

On the other hand, juniors are more satisfied with the aspect 'regularity and predictability', than the seniors, as jobs at lower level are of repetitive nature. Juniors are responsible only for their individual work, whereas seniors take the responsibility for the work done by their juniors also. Therefore, probably juniors are more satisfied with responsibility than the seniors.

It is a general impression in the profession, that work in library is monotonous, repetitive, routine, mechanical, thankless, hardly challenging and gratifying. But the picture which emerges from this study does not confirm it, as a majority of manpower finds library work satisfying and fulfilling, in descending order of scores, in responsibility, independence, variety, regularity and predictability, use of skills, challenge, etc..

This investigation also finds significant differences in the level of satisfaction with work among male and female workers. Males tend to derive more satisfaction from work than females, probably because of gender based discrimination. Women are late comers in the profession, neverthelss they are equal partners. Therefore, the fair sex should be given fair dealings in work assignments.

There is a need to give more attention to in-service training, as two-fifths of the sample are found dissatisfied/ very dissatisfied with this characteristic. Provision for this type of training should be made at all levels.

It is also a fact that a good number of respondents find themselves mismatched with the library work. The dissatisfying factors are the alarming signals for the need for improvement. It is ironic that library and information management in India is unaware of the work needs of the manpower. There is an urgent requirement of information consciousness on work designing. The professionals are expected to get assignments which involve the maximum of their special skill. Consequently, there is a need for job reanalysis and its redesigning to strengthen the satisfiers and reduce the number of dissatisfiers, thereby improving the internal work motivation and quality in work life.

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Appendix I

List of University Libraries Participating in the Sample.

1. Banaras Hindu University Library, Varanasi
2. Bombay University Library, Bombay
3. Calcutta University Library, Calcutta
4. Delhi University Library, Delhi
5. Indian Institute of Technology Library, Delhi
6. Indore University Library, Indore
7. Jadhavpur University Library, Calcutta
8. Jawaharlal Nehru University Library, Delhi
9. Karnatak University Library, Dharwad
10. Kashmir University Library, Srinagar
11. Kerala University Library, Trivandrum
12. Kurukshetra University Library, Kurukshetra
13. Madras University Library, Madras
14. Mysore University Library, Mysore
15. Orissa University of Agriculture & Technology Library, Bhubhaneshwar
16. Panjab University Library, Chandigarh
17. Panjab Agricultural University, Ludhiana Library
18. Poona University Library, Poona
19. Rabindra Bharati University Library, Calcutta
20. Rajashtan University Library, Jaipur
21. S.N.D.T. Women's University Library, Bombay
22. Utkal University Library, Bhubhaneshwar
23. Vikram University Library, Ujjain

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METHODOLOGY FOR MAPPING INFORMATION NEEDS OF RESEARCH SCIENTISTS IN THE FIELD OF POWDER METALLURGY

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Information needs of R&D personnel in a well-focused research speciality can be objectively gauged by analysing literature cited in research articles published in leading journals. An illustrative exercise for the speciality 'Powder Metallurgy' shows that non-journal and journal sources are evenly cited. The most significant among the former are: monographs, serials, conference proceedings, books and patents. There is a concentration effect among the journal sources. Non-journal sources show a substantially lower half-life. Besides mapping the information needs of research professionals, the proposed methodology can be employed for a comparative study of information sources relevant to different areas.

INTRODUCTION

Acquisition of specialised research journals, monographs, serials and a variety of other technical documents to meet the information needs of an industrial R & D personnel calls for substantial investment. The high subscription rates for international journals and serials make it imperative that the selection must be made with more than mere educated guesswork on the part of the librarians or research scientists. Too often, journals are subscribed on the basis of expert opinion of the founding/senior members of the research team and the law of inertia keeps the subscripitions going. While the opinions of subject experts must count, availability of a more objective and rigorous methodology of selection would certainly be of great advantage to make the best use of the allocated funds. Hard choices should not be based on soft information.

Since no library can acquire and stock all documents and journals relevant to an area of research, it must strive to identify those journals that satisfy the bulk of the information needs of the research scientists. Happily, in any research speciality, a minority of elite journals carry a majority of significant research results that are actually consulted and used by the peer group. Garfield [1] showed that in 1969 a mere 152 journals accounted for nearly half of all reference citations to scientific journals. Further studies have corroborated the fact that the number of core journals in science and technology is relatively limited. A study of engineering journals [2] showed that less than 50 journals accounted for half the citations made to 240 journals surveyed. This "Concentration effect" ought to be even more pronounced for small, well-focused research specialities.

Industrial R & D work normally has well defined parameters and the information scientists assisting the research unit should be able to identify the core documents relevant to the research unit through a simple exercise. One of the aims of the present study is to demonstrate the concentration effect in industrial research areas and its implications for mapping the information needs of industrial research scientists through an illustrative exercise for the research speciality - Powder Metallurgy.

The information needs of an industrial R & D unit go well beyond the so called core journals. It is well known that serials, conference proceedings, monographs, books, patents, hand books and a wide variety of other documents are used by R & D personnel. The relative weightage of these non-journal items varies from field to field, but engineering/technology research makes greater use of these sources than is evidenced in basic sciences at large. Mapping the relative needs of non-journal items for R & D personnel is vital, particularly for the industrial scientists. Most studies aimed at assessing information needs have dealt with the basic sciences and nearly the entire emphasis is on determining significant journals.

The present study shows that for industrial research specialities non-journal information sources are as important as journals. Providing non-journal information inputs to R & D staff is indeed a challenging task for the library and information personnel attached to the research unit.

METHODOLOGY

The utility of a research document to a researcher is primarily mirrored by the number of citations it received by subsequent research documents - as the future research efforts rest on the current state of knowledge. Thus, the documents included in the reference list given at the end of the research papers in a leading research journal of a given research speciality may be considered to be significant documents needed by the practitioners/researchers in that speciality. It is with this premise in view that an analysis of reference lists of vol. 23 and a part of Vol 24 of the International Journal of Powder metallurgy, a leading international journal in the field of Powder Metallurgy, was carried out to understand the relative importance of journal and non-journal documents and to rank the journals, serials, monographs, books, handbooks, etc. This exercise was done with the following objectives :

(a) develop a methodology of mapping information needs of research scientists in a narrow research speciality, and

(b) compare the communication pattern of industrial/applied scientists with their counter parts in pure sciences.

Powder Metallurgy (P/M), the research speciality chosen for the present study, deals with the production of materials and objects by pressing, binding and sintering powdered metal. Although the science and technology of P/M is not new, recent developments in the area of production of ultrafine particles and rapid solidification have given P/M a fillip in producing materials with greater strengths and novel (non equilibrium) compositions which cannot be achieved by solidifying from the melt. P/M accounts for nearly 5% of all papers abstracted in the 'Metals Abstracts'. The total number of papers abstracted annually under this section is about 1800. Thus, P/M is a distinctive research speciality.

The International Journal of Powder Metallurgy (the journal chosen for the present study) is a publication of the American P/M Institute. Published quarterly since 1965, it has a circulation of over 3300 copies. The journal publishes original research papers and state-of art reports under the section R & D and E & T (Engineering & Technology), respectively.

CITATION ANALYSIS

The present investigation is based on an analysis of citations made in the reference lists of 18 R & D contributions and 21 E & T articles. These papers were authored by 72 contributors, averaging a shade less than two authors per article. Half the R & D papers and nearly two-thirds (64%) of all (39) contributions emanated from U.S.A. Other contributing countries (in the descending order) were Japan, Sweden, India, U.K. and Korea. US accounted for 48% of the authors of R & D contributions and 61% of all the authors.

Nearly 5.5% of the authors and 8% of the articles originated from India. The authors with Indian names, but based abroad accounted for another 7% so that Indian expertise amounted to one-eighth of the total authorship.

43% of the authors had their affiliation with the industries/ Corporate R & D centres. Academe accounted for nearly a quarter (26%) and the balance were linked to governmental research institutes and the other non-profit organisations. The distribution of institutional affiliation reveals a substantial bias in favour of applied/industrial research reflecting the highly applied nature of the speciality of P/M.

The reference lists of 39 papers included in the study threw up 497 references (citations made) in all, averaging 12.7 references per paper. The R & D articles accounted for the bulk of these references with 20.5 references per article. The corresponding number is merely 6.1 for E & T papers. The average number of citations made per paper for the entire scientific literature is estimated to be around 15. While biomedical research is characterised by a high average of around 30 references per paper, the number ranges between 10 to 15 for physical sciences and engineering research. The citations per paper in a discipline depend on the number of active scientists in the field, the degree of recent developments and citation habits of different groups [3]. A sample survey of 120 papers under the Powder Technology section of 'Metal Abstracts' showed an average of 15.7 references per article.

INFORMATION PROFILE OF P/M

The documents cited in the literature of a discipline mirror the nature of the discipline, the degree of current research activity and the pattern of professional communication among the participants. Out of the total references (497) sampled in the study, a little over half (54%) were made to ninety journals and the balance were distribted over a variety of non-journal sources.

Journal Literature

A very high proportion (84%) of citations made to journals were made to metallurgy/materials science journals. This points to the highly specialised nature of the speciality. It is a rarity for an engineering journal to cite other engineering journals so heavily. For instance, among the top fity journals citing engineering journals, the highest percentage of engineering citation is just 55% [2]. Just eleven journals accounted for half of all the journal citations (Table 1). The high degree of journal concentration indicates the specialised nature of P/M. Earlier studies on Veterinary Science, another well focused applied area, showed that mere five journals accounted for half the citations made to all journals [4]. The small number of journals making up the "first half journals" list suggests that an industrial R & D unit can effectively meet its journal needs by subscribing to about a dozen specialised journals.

The most cited journal in our list is a mainstream metallurgy journal-Metallurgical Transactions - Physical Metallurgy and Materials Science. (P/M is a subfield of Physical Metallurgy). It is a primary journal published jointly by Met Society and other related professional societies. The "first half journals" are evenly distributed (five each) between exclusive speciality (P/M) journals and journals from the broad area of Metallurgy/Materials Science. The lone outsider in this list is the Journal of Applied Physics. Its appearance in the "first half journals" list should not be surprising as the journal ranks fifth among the journals most frequently cited by engineering journals [2]. The area of applied physics has historically been the precursor of new developments in all areas of engineering.

It is note worthy that two journals in the"first half journals" list - 'Journal of Metals" and 'Metal Powder Report' - are not primary research journals. These have been cited for technically useful research summaries and state-of-art reports. Apparently, applied scientists find citing these review journals functionally convenient, as they serve as surrogates for a much larger body of research papers. The review journals serve to sift important findings from the routine by critically evaluating proliferating literature scattered in sometimes inaccessible sources. They assimilate substantive findings of a large number of primary research papers, thus acting as a filter and digester of research findings. The practical minded engineering community rightly values these distillations.

Four primary speciality journals that make the "first half" list are International Journal of Power Metallurgy (USA),Powder Metallurgy (UK), Powder metallurgy International (FRG), Soviet Powder Metallurgy and Metal Ceramics (USSR). They present a truly international mix. The availability of the Soviet Journal in English language has certainly facilitated its good showing. Powder Metallurgy International (FRG) and another "first half journal" Acta Metallurgica have texts of papers in English and summaries in French and German. Thus, the universe of litrature cited in the International Journal of Powder Metallurgy is

TABLE 1

List of "First Half Journals"

Sl. NO.	Journal	A	B	C
1.	Met Transactions-A	USA	30	11
2.	J Metals	USA	16	8
3.	Int J P/M	USA	14	10
4.	Powder Metallurgy	UK	14	8
5.	Acta Metallurgica	USA	12	6
6.	Powder Metallurgy International	FRG	12	6
7.	Soviet P/M and Metal Ceramics	USSR	12	6
8.	TMS - AIME	USA	10	6
9.	J Materials Sci	UK	8	3
10.	Metal Powder Report	UK	6	6
11.	J Applied Phys	USA	6	4

A - Country of Publication

B - No. of Citations Received

C - No. of Citing Articles

largely limited to sources in English language. Ten non-English journals among the ninety cited journals acounted for merely 5% of the total citations. The study reinforces the observation that English is fast becoming the international language for scientific communication.

Non-Journal Literature

Non-journal sources are also a crucial component of technical information consulted by researchers and cited in primary research papers, though a cursory look at scientometric studies on communication profile of scientific disciplines shows that scientific journals are the sole significant source of primary scientific information. In pure sciences, this is very nearly the case and most of the studies deal with the basic sciences only.

In the present study, nearly half (46%) of the citations refer to non-journal documents, such as conference/symposium proceedings, monographic series, multi authored compilations comprising review papers on an individual theme, books, handbooks, theses, technical reports, international and national standards, personal communications, etc. It is understandable for the engineering community to place a great value on non-journal sources since the use of patents, technical reports, standards and data hand books plays prominent role in the engineering practice. A thematic collection of edited volumes and the annual serials, too, find a greater favour in the engineering literature for the same reasons which make review journals popular.

While non-journal publications are undeniably important to industrial/applied researchers, they are usually inadequately subscribed, poorly indexed and hard to retrieve in most of the libraries. The diversity of the non-journal sources, non-standardisation of their format and titles, irregular frequency of their publication and poor marketing make the acquisition of many non-journal sources much more cumbersome resulting in their inadequate accessibility to researchers. Garfield has gone so far as to call the conference literataure, the single most important non-journal source, as 'bibliographic night-mare'.

In the present study, monographs and serials together accounted for nearly one-third (81 out of 229) of the non-journal citations, followed by conference proceedings (39), books (27) and patents (24). Citations to three annual serials rivaled the top ranking journals. These are : Modern Developments in P/M (19 Citations), Progress in P/M (8 citations) and Horizons in P/M (5 Citations,). Such highly cited serials deserve to be treated at par with review journals for the purpose of acquisition. Most cited monographs were 'Rapidly Solidified Alloys and their Mechanical and Magnetic Properties' (5 citations) and Titanium Science and Technology'(5 Citations). Monographs on Rapid Solidification and Titanium Alloys attracted 21 and 9 citations respectively. Other monograph themes for which multiple citations were observed are Boron Compounds and their Alloys, Laser Processing, Aluminium Alloys and Sintering. In view of the low median age (2.5 years) of monographs, the identification of highly cited monograph themes can be employed as one of the ways of identifying current areas of thrust in the research speciality. Among the handbooks, 'Metals Handbook, (vol 7, ninth ed.) was cited the most. The books which received multiple citations are 'Liquid Phase Sintering' (1985), 'Quantitative Stereology' (1970) and 'Influence of Metallurgy on Machinability' (1975). Among patents, U.S. patents were the most cited (79%) followed by U.K. and Japanese patents.

HALF LIFE OF CITED SOURCES

Research papers dealing with active research fronts tend to quote more recent research papers for obvious reasons. Thus, median age of references (citing half life) can be considered as an indicator of the extent to which the citing journal concerns itself with active research areas of current relevance. The average citing-half life for all journals covered by SCI (Science Citation Index) is 6.8 years. In comparison, more active area of biomedical sciences shows a half life of around five years while for the relatively old, established and sedate discipline of mathematics the corresponding figure is over ten years. In the present study, the citing half life for all 497 documents is 5.75 years. The half life of journals and non-journal components is 7.75 years and 3.5 years, respectively. Among the non-journal items, multi-authored monographs and serials, showed the smallest half life (2.5 years). The corresponding figure was 3.75 years for conference proceedings.

The lower citing half-life of literature cited in the target journal, International Journal of Powder Metallurgy, indicates that the journal truly deals with the frontier areas in P/M. The lower half-life of non-journal documents, particularly monographs, serials and conference proceedings, suggests that a research team working in the active areas of current relevance must be provided an easy access to these relatively inadequately retrievable sources. Altogether too much emphasis on journals and too little on non-journal items is evidenced in the best of the libraries. The libraries attached to engineering/industrial R & D centres and technical institutes must insitutionalise ways and means of determining and procuring recent non-journal documents.

CONCLUSION

The present study demonstrates that an analysis of literature cited in a leading journal of a well focused research speciality can be employed to delineate communication profile of the speciality and information needs to researchers in the area. It is found that :

a) There is a definite concentration effect with regard to journals. Merely eleven journals account for half the journal citations made in a leading Powder Metallurgy Journal.

b) Review journals figure prominently among the highly cited journals.

c) Non-journal sources are cited nearly as frequently as journals in industrial research.

d) The citing half-life of non-journal documents is substantially lower than that of cited journals indicating the importance of streamlining prompt acquisition of non-journal sources by libraries of engineering R & D units.

e) Highly cited serials for all practical purposes have features of review journals.

f) Literature needs of powder metallurgists are evenly distributed between speciality journals and journals covering the broader area of metallurgy/materials.

In conclusion, the information needs of research personnel working in well defined research areas can be well mapped by analysing the profile of cited literature in the leading journals of research speciality.

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CITATIONS IN INDIAN AGRICULTURAL RESEARCH - AN ANALYSIS

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Citations from the doctoral dissertations in the field of agriculture from 1981 to 1988 have been analysed in order to determine the Indian journals most frequently used by researchers in the field of agriculture. A total of 7049 citations were collected, compiled and analysed. The most important Indian journals identified by citation analysis were Journal of Indian Society of Soil Science, Indian Journal of Agricultural Science, Indian Journal of Agronomy, Indian Journal of Agricultural Economics, Madras Agricultural Journal, Fertilizer News, Indian Journal of Entomology, Indian Farming, Indian Journal of Plant Physiology and Indian Phytopathology.

INTRODUCTION

Agriculture occupies the most vital place in India's economy. It provides livelihood to about 70% of the country's population and contributes more than 40% of the national income. Beside food, agriculture provides important raw material for many industries in the country. This necessitated an improvement in the tools and techniques employed in agriculture. Consequently agricultural research, education and extension activities are expanded, and carried out in various academic and research institutions in the country. This made the associated libraries to acquire literature, especially journal literature on agriculture and allied fields on an increasingly higher scale.

Due to the sustained growth in periodical literature and its subscription rates, the librarians find it difficult to procure an optimum number of periodicals for their libraries with lack of storage space and shrinking budget. Hence the librarians face constraints in their efforts to determine the optimum measures of collection development and maintenance policies with limited amount of money and space available with them and also to meet the current and anticipated needs of the library users. They are forced to discontinue the subscription to less used journals and thus it is not possible for them to do justice in the selection of periodicals without a ranked list of journals. In consquence it becomes necessary for librarians to apply suitable methods for selection of the most used periodicals in agriculture. Studies for determining the most referred periodicals in a particular field have entered the scene not earlier than the four decades ago [1]. The examples of such studies done in various fields of agricultural science are the works of De Oliviera [2], Deshmukh & Ashok Kumar [3], Hadagal [4], etc.

OBJECTIVES

The study deals with the analysis of citations in Indian agricultural research with the purpose of identifying the most cited Indian journals in the field of agriculture.

METHODOLOGY

As it has been already mentioned, the selection of important journals is based on citation analysis. It consists in recording and analysing the references from Ph.D dissertations submitted in Indian Agricultural Research Institute (IARI), Delhi. A total of 667 theses were submitted during 1981 - 1988 for the award of Ph.D degree. They contained a total of 7049 citations which were collected, compiled and analysed.

LIMITATIONS

Government publications, books, proceedings, bulletins, theses etc. are excluded from the study. The list gives the ranking of only Indian primary periodicals. Foreign periodicals are not considered in the study. The scope is limited to the field of agricultural science excluding animal sciences and forestry.

FINDINGS

The doctoral dissertations contained a total of 7049 citations from Indian primary periodicals on agriculture. It is proposed to tabulate these citations in order to determine the most frequently cited periodicals in this field. Table 1 presents a rank list of the cited periodicals with the number of citations they received, cumulative citations and percentage.

Table 1.

Ranked List of Cited Periodicals

S.No.	Name of Journal	Rank	Citations	Cumulative Citations	Percentage
1.	J of Indian Society of Soil Science	1	803	803	11.39
2.	Indian J of Agricultural Science	2	637	1440	9.04
3.	Indian J of Agronomy	3	515	1955	7.31
4.	Indian J of Agric. Economics	4	455	2410	6.45
5.	Madras Agric J	5	373	2788	5.29
6.	Fertilizer News	6	330	3113	4.68
7.	Indian J of Entomology	7	223	3396	3.16
8.	Indian Farming	8	174	3510	2.47
9.	Indian J of Plant Physiology	9	167	3677	2.37
10.	Indian Phytopathology	10	123	3800	1.74
11.	Pesticides	11	120	3920	1.70
12.	J of Nuclear Agric. and Biology	12	118	4038	1.67
13.	Bull Indian Society of Soil Science	13	115	4153	1.63

14.	Indian J of Genetics & Plant Breeding	14	113	4266	1.60
15.	Indian Journal of Nematology	15	104	4370	1.47
16.	J of Maharashtra Agric University	16	95	4465	1.35
17.	Mysore J of Agric Science	16	95	4560	1.35
18.	Agric Situation in India	17	90	4650	1.27
19.	J of the Indian Society of Agric Statistics	18	85	4735	1.21
20.	Indian J of Agric Research	19	80	4815	1.13
21.	Current Science	20	75	4890	1.06
22.	Indian J of Experimental Biology	21	73	4963	1.03
23.	Indian J of Mushroom	22	71	5034	1.01
24.	Sankhya	23	68	5102	0.96
25.	HAU J of Research	24	65	5167	0.92
26.	J of Research PAU	25	60	5227	0.85
27.	Proc. of the Indian National Science Academy	25	60	5287	0.85
28.	Science and Culture	25	60	5347	0.85
29.	Indian J of Genetics	26	58	5405	0.82
30.	J N K V V Res J	27	48	5453	0.68
31.	Cotton Development	28	45	5498	0.64
32.	Indian J of Horticulture	28	45	5543	0.64
33.	Indian J of Plant Protection	29	42	5585	0.59

34.	Indian J of Microbiology	30	41	5626	0.58
35.	Indian J of Weed Science	30	41	5667	0.58
36.	Bull of Grain Technology	31	40	5707	0.57
37.	Indian Oil Seeds J	31	40	5747	0.57
38.	Haryana J of Agri c. Science	32	38	5785	0.54
39.	Hindustan Antibiotics Bull	32	38	5823	0.54
40.	Indian J of Extension Education	33	35	5858	0.49
41.	J of Indian Potato Association	33	35	5893	0.49
42.	Indian J of Agric Chemistry	34	33	5926	0.47
43.	Annals of Arid Zone	35	30	5956	0.43
44.	Seed Research	35	30	5986	0.43
45.	Pantnagar J of Research	35	30	6061	0.43
46.	Agric Res. J of Kerala	36	28	6044	0.39
47.	Legume Research	36	28	6072	0.39
48.	Current Agriculture	37	25	6097	0.35
49.	Crop Improvement	37	25	6122	0.35
50.	Entomon	37	25	6147	0.35
51.	Financing Agric	37	25	6172	0.35
52.	Farm Journal	38	24	6220	0.34
53.	Progressive Horticulture	38	24	6220	0.34
54.	Annals of Agric Res. (India)	38	24	6244	0.34

55.	Indian J of Ecology	39	22	6266	0.31
56.	Indian J of Helminthology	39	22	6288	0.31
57.	Indian J of Mycology & Plant Pathol	39	22	6310	0.31
58.	Pestology	40	20	6330	0.28
59.	Vegetable Science	40	20	6350	0.28
60.	Forage Research	40	20	6370	0.28
61.	Indian J of Pharmacology	41	19	6389	0.27
62	Indian Potato J	41	19	6408	0.27
63.	Indian Agriculturist	42	18	6426	0.25
64.	Punjab Horticultural J	42	18	6444	0.25
65.	Intensive Agriculture	43	17	5461	0.24
66.	Oilseeds J	43	17	6478	0.24
67.	Indian Coffee	43	17	6495	0.24
68.	Agric Science Digest (India)	44	16	6511	0.23
69.	Bull of the Botanical Soc of Bengal	44	16	6527	0.23
70.	Indian Cotton Growers Review	45	15	6542	0.21
71.	Mysore Agric J	45	15	6557	0.21
72.	Newsletter Univ of Agri Sci Bangalore	45	15	6572	0.21
73	Oryza	45	15	6587	0.21
74.	Seeds and Farms	45	15	6602	0.21
75.	South Indian Horticulture	45	15	6617	0.21

76.	Bull of the Indian Phytopathological Society	46	14	6631	0.19
77.	Indian J of Sugarcane Res. & Development	46	14	6645	0.19
78	J of Scientific & Ind Res	47	13	6658	0.18
79.	J of Soil & Water Conservation in India	47	13	6671	0.18
80.	Geobios	47	13	6684	0.18
81.	Economic & Political Weekly	48	12	6696	0.17
82.	Andhra Agric J	49	10	6706	0.14
83.	Indian Coconut J	49	10	6716	0.14
84.	J of the Indian Botanical Society	49	10	6726	0.14
85.	PKV Research J	49	10	6736	0.14
86.	Proc of the National Acad of Science (India)	49	10	6746	0.14
87.	Allahabad Farmer	50	9	6755	0.13
88.	J of Postgraduate School IARI	50	9	6764	0.13
89.	Acta Botanica Indica	51	8	6772	0.12
90.	Arecanut and Spices Bull	51	8	6780	0.12
91.	Indian J of Farm Sci	51	8	6788	0.12
92.	Indian J of Mete-ology & Geophysics	51	8	6796	0.12
93.	Indian J Nutrition & Dietetics	51	8	6804	0.12
94.	Indian J of Parasitology	51	8	6812	0.12

95.	Indian J of Plant Nutrition	51	8	6820	0.12
96.	Indian Potash J	51	8	6828	0.12
97.	INSA Newsletter	51	8	6836	0.12
98.	J of Indian Statistics Association	51	8	6844	0.12
99.	J of Plantation Crops	51	8	6852	0.12
100.	Indian Sugar	51	8	6860	0.12
101.	Proc of Indian Acad Science (Sec B-Plant Sc)	52	6	6866	0.08
102	J of Res Assam Agric Univ	52	6	6872	0.08
103	Fertilizer Technology	52	6	6878	0.08
104	ICAR Technical Bull	53	5	6883	0.07
105	Indian Horticulture	53	5	6888	0.07
106.	Indian J of Biochemistry and Biophys	53	5	6893	0.07
107.	Indian J of Heredity	53	5	6898	0.07
108.	Indian Sugar Crops J	53	5	6903	0.07
109.	J of Mahatma Phule Agric Univ	53	5	6908	0.07
110.	Kheti	53	5	6913	0.07
111.	Land Bank J	53	5	6918	0.07
112.	Tech Bull Andhra Pradesh Agric Univ	53	5	6923	0.07
113.	Tobacco Research	53	5	6928	0.07
114.	Memoires of Entomological Soc of India	53	5	6933	0.07
115.	Oil and Oilseeds J	53	5	6938	0.07
116.	59 Journals	(less	than 5 each)	7049	1.57

Journals having at least 5 citations are listed in the table. In order to avoid a long list, 59 journals having less than 5 citations are grouped at the end of the list. Thus from table 1 it is observed that the most important journals as indicated by the frequency of citations they received are Journal of Indian Society of Soil Science, Indian Journal of Agricultural Economics, Madras Agricultural Journal, Fertilizer News, Indian Journal of Entomology, Indian Farming, Indian Journal of Plant Physiology and Indian Phytopathology. Out of the 174 journals listed above, first ten receive 53.9% (i.e. 3800) of the total citations (7049), where as 46.1% of citations are to the remaining 164 journals.

CONCLUSION

As a large number of periodicals are published in the field of agriculture. The citation analysis has been conducted by analysing the citations given in the Ph.D dissertations submitted in IARI to find out the most important Indian journals. The journals thus identified provide library committeess with a selection list for the procurement of Indian agricultural journals. This will also help research scholars and scientists in selecting the most relevent journals in their area of research.

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DETERMINING PRIORITES FOR COMPUTERISATION IN LIBRARIES

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Availability of fairly advanced micro-computers and application softwares at affordable prices is now encouraging libraries to intorduce computerisation in various services and in the management of house-keeping activities. A major problem faced while undertaking the computerisation, especially by large libraries, concerns deciding the sequence of activities to be computerised so as to satisfy the expectations of various groups working in the library. This issue is addressed here by an application of the Interpretive Structural Modelling method to determine priorities among numerous areas of work in the library of the University of Bomby.

INTRODUCTION

The capacity to store a large volume of information in a cost efective manner combined with accuracy and consistency in processing and efficiency in the retrieval of desired information have made computer an essential tool for library management. With rapid advances in computer and telecommunication technologies, the power of older generation mainframe computer systems is now available in the micro-computers at a price affordable to even small organisations. No wonder, libraries of all sizes are attempting to computerise many of their activities. Realizing these possibilities, a few suggestions are made here in regard to the introduction of computer based operations and services in different libraries in the country and linking them to form a network in future [1]. However, there cannot be a computerisation plan universally applicable to all the libraries. The developmental stage of a given library, generally, guides this process of computerisation.

The promise of computer technology raises the expectations of all those connected with a library. For example, the different user groups want more extensive services, professional staff members expect shift in work load, management and authorities see it as an instrument to tone up the administrative control and so on. It is obvious that taking up simultaneously all such activities for computerisation is not possible in practice. Therefore, it becomes necessary to determine priority among various activities so that the demands are met reasonably. In a library situation, the task of deciding priority should generally not be entrusted to a single person because the resulting ranking may prove to be lop-sided and resented by other colleagues whose co-operation is crucial for the successful and meaningful computerisation. What is needed is consultation among all the groups to arrive at a plan reflecting the collective thinking and viewpoint.

Developments in operations researach/management offer a number of interactive methods which combine the subjective judgement of multiple groups with appropriate analytical techniques to derive priorities for the given set of objectives or activities [2], [3]. One among these is the Interpretive Structural Modelling (ISM) method which is presented in this paper in the perspective of its application for determining priorities for computerisation of various areas in the library of the University of Bombay.

THE UNIVERSITY LIBRARY SCENARIO

The library of the University of Bombay is a large academic library of more than one hundred year's standing. The document collection is spread in the libraries at Fort, Churchgate and Vidyanagari, Santacruz (East). The collection comprises books (exceeding 6,00,000), rare books (10,000) manuscripts (9,000), theses (20,000) and non-book materials (1,800). The library receives more than 1,200 serials and has a huge stock of back-volumes. It is also a depository library for publications of the United Nations and World Bank. Yearly addition of books to the library is of the order of 12,000. The library is serving more than 16,000 users comprising post-graduate students, research scholars, teachers from the University Departments and affiliated Colleges and workers in other walks of life. The library services and house-keeping tasks are managed by the total staff of 110 out of which the professional staff numbering 46 is organised in different sections.

Continuous growth in library material and increasing number of users making a variety of demands were the factors which led to the idea of computerisation of certain work areas. It is clear that a very large computer system is needed to cope with the volume of material in the Bombay University Library. The amount of financial resources and trained manpower necessary to operate such a system are simply not available with the University. It was, therefore, decided to follow the 'incremental' approach i.e. to start with a microcomputer system and general purpose applications softwares to cover a few library areas, train the professional staff and, most importantly, to introduce a new work culture consonant with the computer induced changes and then expand in terms of a bigger system and/or networking [4], [5]. Naturally, this underlined the importence of the task of priority-setting among different areas for systematic introduction of computerisation. The ISM method employed for this purpose is outlined in the next section.

THE INTERPRETIVE STRUCTURAL MODELING METHOD

The ISM method is divided into two parts. The first part consists of identifying the activities and comparing them with each other subjectively. In the second part, the techniques from matrix algebra and graph theory are applied to transform the judgements obtained in the first part to arrive at a representation of activities arranged according to priorities. The method is simple to use and allows all the groups to debate and influence the priority-setting process to a certain extent in a democratic manner. The credit for the development of ISM method goes to Warfield [6] and it has been applied in a number of real life situations. [7], [8], [9], [10] & [11].

The following steps describe the method :

i). Identification of activities, say A1, A2, ...An among which priorities are to be determined.

ii). construction of an appropriate contextual relation, say 'R', to compare any two activities at a time. For example, A1 "is less important than" A2, A1 "is more useful than" A2 or A1 "does support" etc.

iii). Comparison of each activity with all the remaining activities using the above contextual relation to generate a comparison matrix. It means that if the answer to the question "Is A(I) more important than A(J) ?" is "yes", then value 1 is entered in the (I,J) cell of the matrix, otherwise, the value entered is 0; this process is continued to cover all the activities.

iv). Construction of a directed graph (digraph) establishing structural relationship among the activities on the basis of the comparison matrix.

v). Modification of the comparison matrix if review of the digraph indicates any glaring inconsistency.

PRIORITY STRUCTURE FOR LIBRARY AREAS

The University Librarian and his professional staff participated in the process of deciding the sequence of areas to be taken up for computerisation, using the ISM method. The method was initiated by examining all the major activities of the library and the following broad areas were identified:

A 1 : Book collection development

A 2 : Serials procurement and control

A 3 : Management of non-book materials

A 4 : Records of special collection

A 5 : Control of manuscripts and rare books

A 6 : Theses processing

A 7 : Cataloguing and subject indexing

A 8 : Referencing and documentation services

A 9 : Lending services

A 10: Financial control

A 11: Personnel administration

A 12: Dead stock records and inventory control

A 13: Co-ordination with different libraries

A 14: Library statistics and research

A 15: Stock verification.

The next step was to construct a suitable relation to compare the above listed areas with each other. It was framed in the form of the following question : "Is area A(I) more important than area A(J) for the purpose of computerisation?"

The guidelines followed for answering this question insisted on considering the contribution of the given area towards improvement of services to the readers, reduction of paper work for the staff, bringing more areas under bibliographical control, increasing information retrieval efficiency and creation of multi-purpose databases. To begin with the areas A1 was compared with the remaining 14 areas and was judged to be more important than the areas A3, A4, A5, A7, A8, A10, A11, A12, A13 and A15 from the computerisation point of view and so number 1 was entered in the corresponding columns of the first row in Figure 1, while, number 0 was entered in columns 1, 2, 6 and 9 of the first row. All the remaining areas were also suitably compared to other areas to generate the comparison matrix as given in Fig 1.

Using the requisite mathematical technique the comparison matrix was converted into the digraph as presented in Figrure 2 where the nodes of the graph are the boxes briefly describing the library areas. The interpretive structure so derived shows the areas to be computerised in order of priority beginning from the top.

The participants in this exercise reviewed the priority structure depicted in Fig 2 and were generally satisfied with the sequence of library areas to be computerised. This helped in formulating a base plan for the computerisation of the library.

PRACTICAL IMPLICATIONS

The priorities obtained here by the ISM method can help in phasing the computerisation plan into various stages. The needs of the library and availability of resources are the guiding factors for this purpose. For instance, four stages as indicated in Fig 2 were envisaged for the computerisation of the university library.

It can be seen that the areas to be computerised at the outset (Stage I) are procurement and control of serials, lending services and processing of theses. In Stage II, book collection development, cataloguing and reference service are proposed for computerisation. The areas dealing with management of non-book materials, manuscripts and special collections are suggested for Stage III and the remaining areas of library administration are to be computerised at Stage IV.

It is clear from the above order of areas to be computerised that the librarian and the staff who participated in this exercise have given top priority to these areas which provide the new service to users and which help the professional staff in gaining more control over the transactions. This is reflected by taking up the processing of the theses collection on a priority basis because information retrieval demand in this area is substantial in an academic library like that of the Bombay Univeristy, while it is relatively weak in bibliographical control. Similarly, the lending section where lots of daily transactions are taking place (issue and return of documents) and the serials control where records are maintained to keep track of the serials received from all parts of the world with varying frequency are the other most important activities.

Since the practice of cataloguing and indexing of books and other materials is fairly well established in this library and the collection is also quite large, the computerisation of these areas is suggested to be taken up at Stage II when, perhaps, a bigger computer system and other resources would also be available. The area of library administration is given the last priority for computerisation because they concern a very limited number of staff and these are the activities which require more of physical efforts such as stock verification.

The major gain of this exercise has been for providing an overall direction to the computerisation of the library activity in areas identified in Stage I. The work started in April 1989 and with the requisite allocation of resources satisfactory progress has been made in the areas of theses collection/ processing and serials control. In a few months time all these are expected to be completed by properly managing the available computer time. The students of the Bachelor of Library Science degree course of the university got the training in computer application and helped in data entry processing. All this has been possible due to an advance planning of the computerisation process as described above.

CONCLUSION

The ISM method offers many advantages in the task of priority-setting among a variety of activities.

a) It can be carried out by a single person or a group consisting of members with varied backgrounds providing flexibility in assigning priority to various activities because it allows members to voice their individual opinions about setting up the priority. It is possible that no consensus may emerge while filling up the comparison matrix. In such cases, separate matrices may be generated and the corresponding interpretive structures combined and compared [12].

b) The activity of building comparison matrix is simple and not time consuming.

c) It can be interrupted at any point and resumed later without any methodological problem. The transformation of the comparison matrix into a digraph involves the application of mathematical concepts. The method, however, being logical, is amenable to computer processing. So, the task of priority-setting among even a large number of activities can be handled easily. An interactive computer programme developed by the first author was used in the case presented above. This facilitated a quick review and modification of the priority structure.

The application of the ISM method provides a framework to articulate discussion and minimise arbitrariness. This exercise can be carried out at many levels. For instance, in the Bombay University Library a fresh exercise of revising priorities for the remaining areas was undertaken after completing Stage I. Again, this method can be used for determining the sequence of activities within a particular section of the library by its staff.

The priority structure of activities generated by the ISM can be subjected to the application of project management techniques of PERT (Programme Evaluation and Review Technique) and CPM (Critical Path Method) by treating it as a network of activities. This can help in the allocation of personnel and computer resources for completing all the activities within a stipulated time-frame. Moreover, the possibility of expediting this work through "crashing" of critical activities by deploying more resources can be explored.

Computerisation in large libraries is a long drawn process and its systematic planning and monitoring is crucial for the success. The aid of composite methods which combine analytical tools with subjective judgement like the ISM, as illustrated here, can prove very useful in these efforts.

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15
A1	0	0	1	1	1	0	1	1	0	1	1	1	1	1	1
A2	0	0	1	1	1	0	0	1	0	1	1	1	1	1	1
A3	0	0	0	1	0	0	0	0	0	1	1	1	1	1	1
A4	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
A5	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
A6	0	0	1	1	1	0	0	1	0	1	1	1	1	1	1
A7	0	0	1	1	1	0	0	1	0	1	1	1	1	1	1
A8	0	0	1	1	1	0	0	0	0	1	1	1	1	1	1
A9	1	0	1	1	1	0	0	1	0	1	1	1	1	1	1
A10	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
A11	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
A12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
A13	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
A14	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1
A15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Fig. 1. The Comparison Matrix for Library Areas

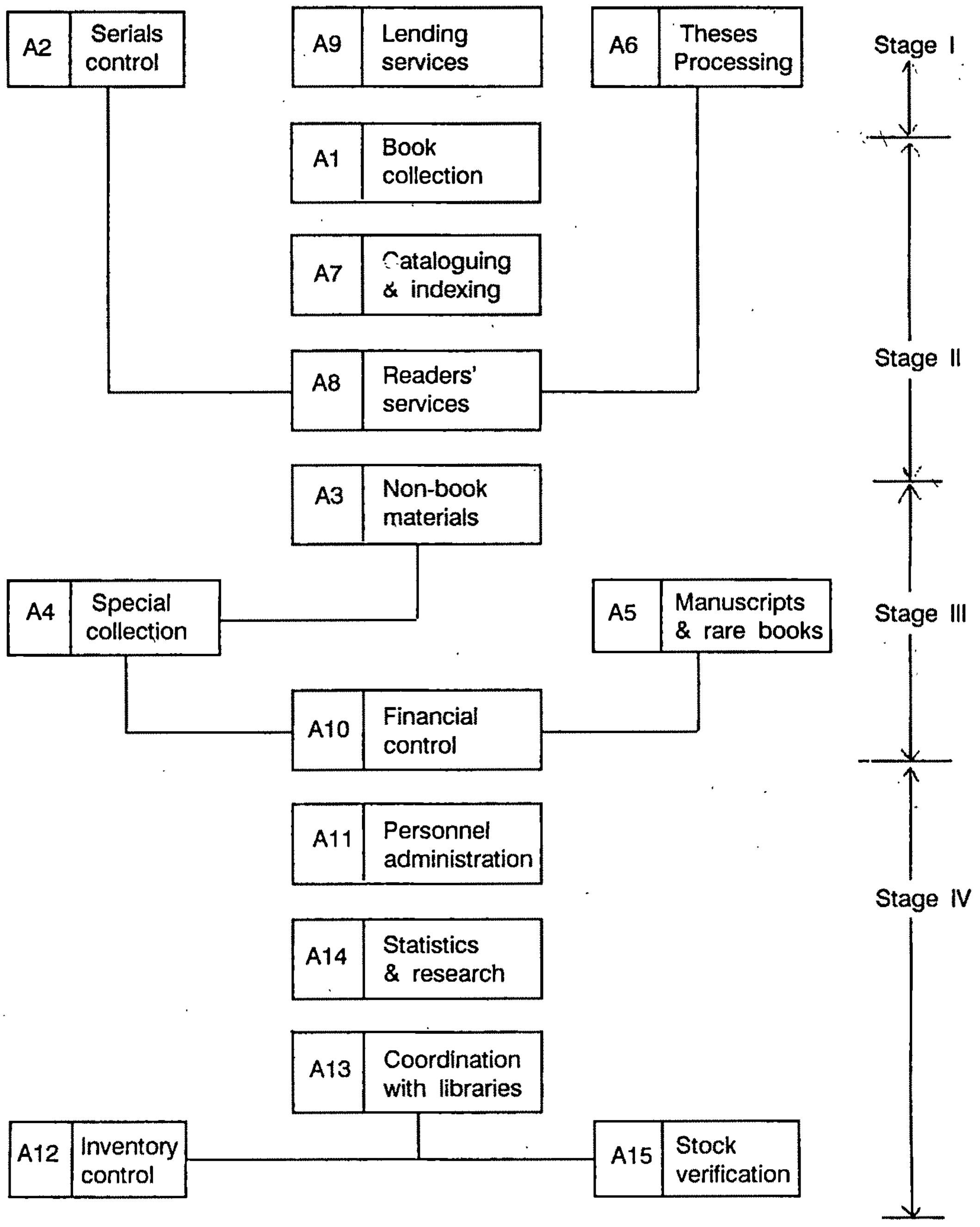

Fig. 2 The Priority Structure for Computerisation of Library Areas

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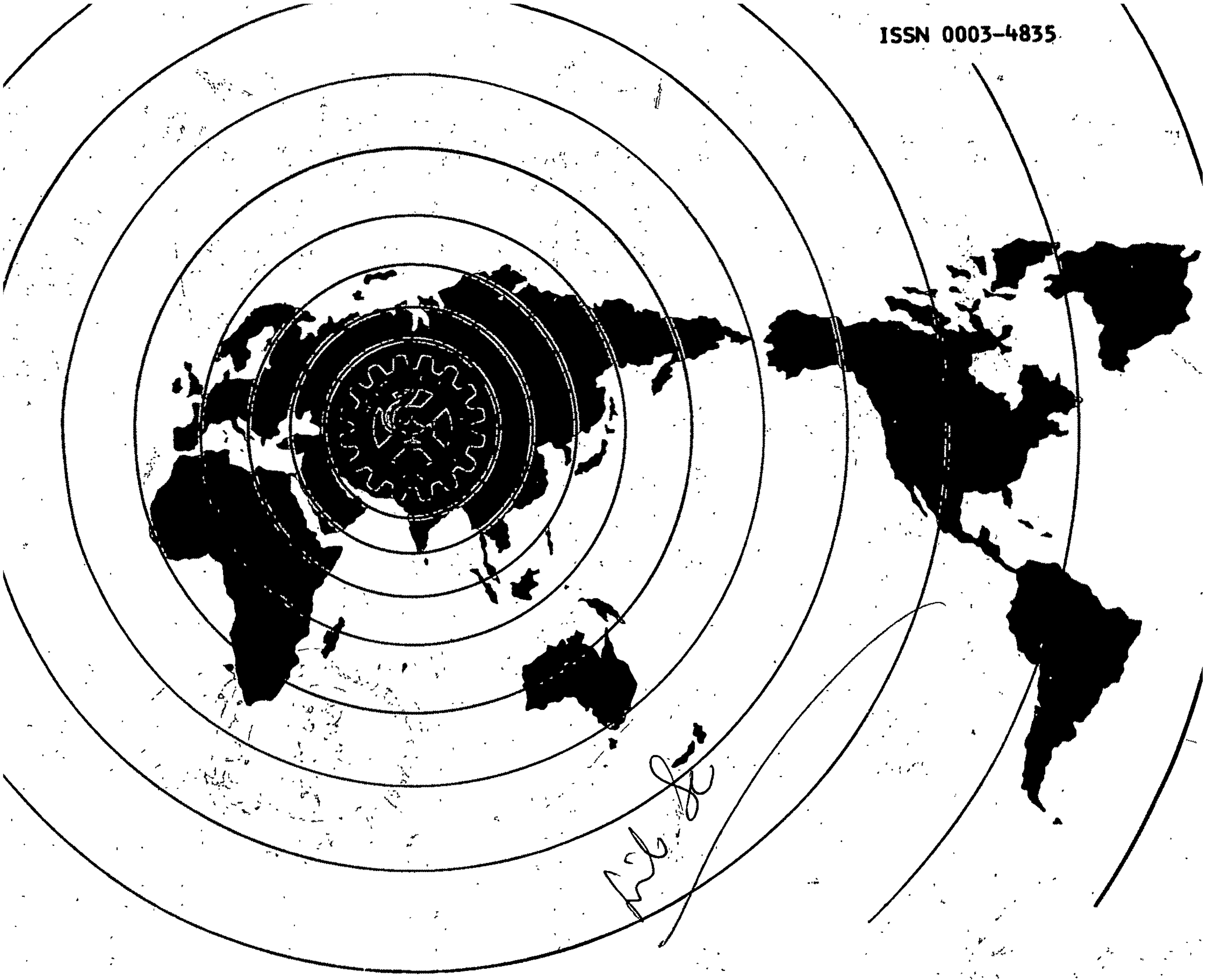

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PRESS CLIPPING FILE – ITS IMPORTANCE IN THE FIELD OF WATER RESOURCES

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Describes the requirement, methodology and importance of the press clipping file organized at Centre for Water Resources Development and Management, Calicut.

INTRODUCTION

Among the published sources of information none is more current than the daily press. In the field of water resources it is an important source of information and has an edge over the other sources of information because of the very nature of the information communicated. Water Resources being a mission oriented discipline, its development and management is monitored by the entire country and attracts a lot of media attention. Two types of information are generally required by the scientists in this field:

a). Short, on the spot, reports on the agro-meteorological and hydro- meteorological conditions as well as on quality, management and degradation of water resources.

b). Lengthy articles written by specialists on the issues in water resources development and planning.

The Centre for Water Resources Development and Management (CWRDM) is one among a chain of autonomous research institutes established by the Government of Kerala in 1978 under the policy of science & technology. It functions as a Centre of excellence for advanced research, training and extension in all aspects of the utilisation of water resources. The Centre has on its staff 22 scientists and 59 technical officers. When the user's demands for current information could not be adequately met with the available sources, the library documentation and information division started the press clipping service in 1986.

OBJECTIVES

The objectives for introducing this service were :

a). To enable scientists/decision makers to identify problem areas where investigations are to be initiated.

b). To disseminate information on prominent issues of current value in the field of water resources which might not be available in books and journals.

METHODOLOGY

Based on the activities of various divisions of CWRDM viz. Groundwater Division, Surface-water Division, Water Quality and Environment Division, Water Management (Agriculture) Division, and Education and Extension Division, seven main subject fields and four fields related to water resources were identified.

The list of subject headings and their respective class numbers are given as follows :

A. *Hydro-meteorology*

- 01 Drought
- 02 Rainfall
- 03 Floods

B. *Water Resources Development and Planning*

- 01 Surface Water
- 02 Ground Water
- 03 Water Supply
- 04 Water Transfer
- 05 Water Transport
- 06 Remote Sensing

C. *Irrigation*

- 01 Irrigation Projects
- 02 Environmental Impact
- 03 Water Distribution

D. *Agriculture Water Management*

- 01 Water Conservation
- 02 Dryland Farming
- 03 Soils & Fertilizers
- 04 Erosion
- 05 Salinity

E. *Pollution*

- 01 Air
- 02 Pesticides
- 03 Water
- 04 Industrial
- 05 Water Treatment
- 06 Waste Treatment

F. *Environment*

- 01 Degradation
- 02 Protection
- 03 Afforestation
- 04 Wasteland Development
- 05 Western Ghats Development

G. *Geo-hydrology*

- 01 Sea erosion
- 02 Land slides
- 03 Earth quakes

Related Subjects

Agriculture
Energy
Science & Technology
Planning & Development

Subjects which have an indirect bearing on the main topic were considered as related subjects.

Seven newspapers were indexed. Out of these, four, namely Economic Times (Bombay),

Table 1

Distribution of Citations According to Main Subjects Divisions 1987

Subject	Citations	% of Total
Hydro-meteorology	147	22.4
Water Resources Development and Planning	131	19.96
Irrigation	83	12.65
Agriculture Water Management	76	11.58
Pollution	96	14.65
Environment	111	16.93
Geo-hydrology	12	1.83
Total	656	100

Financial Express (Madras), Hindu (Madras) and Indian Express (Cochin) were in English and Mathrubhoomi, Malayala Manorama and Kerala Kaumudi, all the three published from Calicut, were in the regional language, Malayalam. This selection of news- papers made it possible to collect information of both regional and national importance.

Newspapers were scanned daily. Short news items, editorials and long articles relevant to the subject fields were marked and their index slips were prepared with appropriate subject headings. An abstract was provided with the items which were not self explanatory. At the end of the month, the marked items were cut from the news papers, compared with the index slips and arranged subject wise.

The distribution of news clippings, collected and filed under various subject headings during the year 1987, are shown in Table 1.

In the cases where the same news item was reported by more than one paper, the one with the maximum information was given preference. When conflicting views on leading issues were expressed in different papers, clippings of both views were included in the file.

ARRANGEMENT

The clippings on a subject field of a particular region were arranged chronologically The clippings were pasted on sheets of paper of the size 30 cm x 24 cm. The number of clippings that could be accommodated on a sheet depended on the size of the clipping. The sheets were then numbered consecutively.

The class number and respective page number constituted the location number for each item. For example, EO4-72 related to a newsclip on Industrial Pollution (EO4) appearing on page 72 of the file.

DISSEMINATION

The stored information was disseminated through the following channels.

a). The "Hydata", the current awareness bulletin of the library consisting of two sections i.e. 'News and Notes' and 'From the Press': News items of the fortnight, significant to the water resources community are included in the former and an index of the news items is given in the latter.

b). "Water-in Press", an annual classified index of the news clipping file: The location number provided in the index connects it with the news items in the file. An extensive subject index is also furnished.

Table 2

Rank List of Topics Based on News Coverage in 1987

Sl. No.	Rank	Subject	Number of Citations	% of Total
1.	1	Drought	93	14.15
2.	2	Water Supply	44	6.96
3.	2	Water Pollution	44	6.96
4.	3	Irrigation Projects	32	4.87
5.	4	Environmental Degradation	30	4.56
6.	4	Social Forestry	30	4.46
7.	5	Groundwater	26	3.90
8.	6	Western Ghats	25	3.8

Table 3

Ranklist of Newspapers

Rank	Newspaper	Number of Citations	% of Total
1.	Financial Express	176	26.87
2.	Indian Express	153	23.35
3.	Hindu	117	17.86
4.	Economic Times	79	12.06
5.	Malayala Manorama	60	9.16
6.	Kerala Kaumudi	38	5.8
7.	Mathrubhoomi	33	4.9
	Total	655	100

DISCUSSION

An analysis of the newsclipping file of 1987 highlights the following important features.

a). In the rank list of topics, on the basis of their news coverage (Table 2), drought of 1987 is shown to top the list which was rightly the most pressing issue of the year seeking solution.

b). It identifies specific problem areas where research activities can be undertaken.

c). It furnishes current statistical information such as rainfall data, data for crop production (both statewise and crop wise), monsoon prospects, etc.

d). It provides an overview of the current water resources scenario of the region. Of the 956 news items, 219 i.e. 33.43% relates to Kerala situations.

e). Newspaper-wise distribution of press clippings reveal that 80% of the information requirements can be met with English Newspapers (Table 3)

CONCLUSION

The preceding discussion affirms the pivotal role of the press clipping file and recognises it as an essential supplement to reference books. It is essential because water resources is a mission oriented discipline and hence there is a need to identify problem areas. Even if the information given is in an embryo stage, it initiates mass attention and addresses itself to a wider audience. Scientists have come to recognize the importance of this source. Many studies have been initiated on the basis of an initial report in the press. It is a springboard for action, a take off point for initiating a project. Press clipping service therefore can be considered as an integral part of a research organization, more so in the field of water resources.

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SCIENTIFIC LITERATURE SERVICE IN TANZANIA – HISTORICAL ACCOUNT

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Gives the historical background of the Tanzania Literature Service and the types of information services it offers to the research scientists engaged in various agricultural and veterinary establishments in Tanzania. It also highlights the requirements of funds for continuation of the service.

INTRODUCTION

The Tanzania Literature Service (TALIS) was established by the Ministry of Agriculture in 1980 as a joint project between the Governments of the Republic of Ireland and the United Republic of Tanzania. It was established with the aim to render Current Awareness Service to the agricultural scientists engaged in agricultural and veterinary research establishments in the rural areas of the country.

TALIS is a scientific literature service in Tanzania similar to the East African Literature Service (EALS) which was providing scientific information to the countries in the Eastern and Central African region including Kenya, Uganda and Tanzania. EALS was in existence for ten years 1967 to 1977 and was serving a number of users in these countries. EALS centre was acquiring about 800 scientific journals regularly and providing information service based on these journals. In 1977 the East African Community (EAC) [2] broke up and EALS had to cease its services to Tanzania. The scientists in Tanzania could not afford to subscribe the journals to keep themselves abreast of new knowledge hence suffered a great information gap. Therefore an alternative arrangement was decided to be made.

In 1978 the Tanzania Government, through the Ministry of Agriculture entered into an agreement with the Irish Government to look into the possibilities of establishing a scientific literature service in Tanzania. As a result, Professor S. Cooney was sent as a consultant to undertake a feasibility study on the establishment of such a service [1]. He toured a number of training institutes and libraries attached to the research institutes in the Ministry of Agriculture and held discussions with all concerned authorities including librarians in the country. Consequently, an agreement for setting up Tanzania Literature Service (TALIS) was reached between the Governments of the two countries: Ireland and Tanzania. Under this agreement signed in Dar-Es-Salaam on September 4, 1978 the donor country, Ireland, undertook to provide the following assistance:

a). One heavy duty Rank Xerox Copier,

b). Type A4 Xerox paper for the 3 years,

c). A consultant for 3 years,

d). Technical assistance for 1 year,

e). Training of technical personnel and

f). Subscription of additional journals costing #1000.00 for 3 years

The Ministry of Agriculture, Tanzania had to provide the necessary funds for recurring expenditure on annual basis covering staff salary, stationery, travel and postage. The Faculty of Agriculture, Forestry and

Veterinary Science (FAFVS) of the University of Dar-Es-Salaam at Morogoro was chosen for accommodating and operating the service. The service started in December 1980 [4].

OBJECTIVES OF SERVICE

The general objective of the Tanzania Literature Service is to provide a wide range of scientific literature service to scientists engaged in research and teaching in the country from the journals received at the FAFVS (now known as Sokoine University of Agriculture) Library. The contribution of the Irish Government was to continue only for 3 years from July 1980 to June 1983. The project was to continue under the sole responsibility of the Tanzanian Government thereafter.

SERVICES

Following services were started to achieve the objective:

a). Circulation of contents pages of selected current scientific journals to the researchers,

b). Supply of copies of articles selected by the users from the contents pages,

c). Supply of copies of articles from back issues, and

d). Supply of copies of reports and other relevant documents.

The Sokoine University of Agriculture (SUA) Library was also supposed to procure and supply the copies of articles from the journals which were not held by the library if requested by the scientists.

OPERATION OF TALIS

Identification of Users

Initially about 120 centers were identified as potential users of the services offered by the Tanzania Literature Service. The designated user centres comprised the following:

a). All the research and training institutes and their experimental stations under the Ministry of Agriculture (KILIMO),

b). All livestock research and training institutes and their investigation centers under the former Ministry of Livestock Development,

c). All research and training institutes under the Ministry of Natural Resources,

d). Other institutions of allied agricultural fields, such as at Uyole, T.P.R.I., etc.

Operation

An information circular about the programme of the TALIS was circulated in all the user centres of the system. Two copies of the list of current journals received by the library were sent to each of the potential user centres. The user centres were requested to select and mark the journals of their interest on one of the lists and send it to the Project Centre so that the service of contents pages of the selected journals may be given to them. Each centre was asked to keep the other copy for its records. The centres which returned the lists indicating journals of their interest were registered as bona-fide user centres for all the above mentioned services free of charge on regular basis.

TALIS centre at Morogoro maintains a journal card index and allocates a number to each user centre. The numbers representing the user centres interested in a particular journal are then encircled on the respective card as shown in Table 1.

Table 1

Sample Card from Journal Card Index

Journal of Agronomy					
(1)	2	3	4	5	6
7	(8)	9	10	11	(12)
13	14	15	16	17	18
19	20	21	(22)	23	24

The card representing the Journal of Agronomy has 4 different numbers encircled on it showing the user centres which have selected it.

TALIS started its service initially with 450 journals and hence, the card index contained 450 cards in December 1980. The number of journals went on increasing with enrolement of more user centres. The contents pages of the journals received in the library are copied by using a Rank Xerox 3600 copier and sent to the interested user centres. The user centres could further select the articles of their interest from the contents pages supplied to them and make requests for photocopies to the TALIS.

A scheduled programme for operating the service at the project centre is based on an 8-week cycle. During the first 2 weeks the journals are received and their contents pages are copied. In the next 4 weeks, the contents pages are mailed to the respective user centres. The scientists in the user centres make the necessary selection of the articles. The requests of the selected items are received at Morogoro. The copies of the articles are made and dispatched to the requesting user centres in next 2 to 3 weeks. Thus, eight weeks is the time lag between the arrival of a journal in the library at Morogoro and the dispatch of copy of the article requested by user centre. In order to maintain the time schedule each copy of contents pages sent to the user carries a stamp mark showing the cut out date for receiving current service. Any request received after this date is treated as retrospective, and hence given only second priority.

PROGRESS OF TALIS

The Tanzania Literature Service is now fully operational. Starting with only 40 potential user centres it serves now over 100 user centres all over the country. The estimated number of scientists, researchers and teachers in these user centres is about 1800-2000.

In December 1980 the first service of contents pages from 66 titles and consisting of 630 articles was sent to 16 enrolled centres. One year after the inception of TALIS centre the number of user centres went upto 40. To date, there are over 100 user centres. The number of contents pages and articles prepared from 1981-1985 is shown in Table 2.

Table 2

Number of Photocopies Produced during 1981-1985

Year	Contents pages	Articles
1981	2000	1484
1982	3966	1122
1983	1333 (3 months only)	—
1984	3564 (7 months only)	1074
1985	3254	860
TOTAL	14117	4540

The figures represent only a small proportion of those of similar services carried out in other countries in Asia, Latin America and the Caribbean. This is mainly due to the frequent breakdown of the machines, nonavailability of spares, insufficient supply of stationery and funds for the project staff to make necessary visits to the user centres to get a feed back.

Despite all the difficulties, TALIS is successful in providing important services such as document supply and current awareness to agricultural researchers and scientists. Inevitably the usefulness of such a service as TALIS cannot be underestimated especially at this time when financial situations do not permit multiple acquisition of current journals by many agricultural scientists and researchers working at different places in the country.

However, it is noted that the future prospects for TALIS depend mainly on the availability of sufficient funds (convertible into foreign exchange) which is required to continue the journal subscription needed for both the service and the institution's teaching program. In the meantime, efforts have been made by the Sokoine University of Agriculture to solicit funds from outside sources in order to maintain at least the existing rate of journal subscription. The Swedish Agency for Research Cooperation (SAREC) is giving a grant sufficient to subscribe 250 titles for a period of three years. Additionally, technical assistance in acquisition of modern photocopying machines including spare- parts, training facilities and other necessary supplies is under negotiations with other donor agencies by the University Administration. All these factors are very vital and critically important for the continuation and existence of TALIS in Tanzania.

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AWARENESS, ACQUISITION AND UTILISATION OF JAPANESE SCIENTIFIC & TECHNICAL INFORMATION IN USA AND EUROPE

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The paper discusses the current trends in the acquisition and utilisation of Japanese scientific and technical information in USA and Europe, the problems faced by them in its acquisition and utilisation and the role played by Japan in the internationalisation of Japanese information. It also gives a brief account of Indian scene of Japanese information.

INTRODUCTION

After World War II, Japan has brought about technological revolutions in heavy and chemical industry, ship building, automobiles, electronics, materials, biotechnology, computers, etc. [1]. With the introduction of high-tech age, Japanese industries are slowly veering towards manufacturing goods with higher unit value, export of technology [2] and product innovation [3]. Now Japan is an economic superpower with great strength in manufactured export and one of the World's highest income levels [4]. Well planned R & D policy has been one of the principal factors responsible for Japan's spectacular economic growth and revolutionary breakthrough in technology in the last 40 years. Japanese postwar R & D policy has been characterised by the Government's refraining from direct interference and instead offering information and recommendations to form the guiding principles for industrial development [5]. Obviously, the World has been looking for more and more information on Japan's scientific and technical achievements. Here, it is intended to analyse the awareness, acquisition and utilisation of Japanese scientific & technical information (hereafter referred to as Japanese information) in USA and Europe so as to give a brief account on this subject to Indian information scientists, managers and users.

AWARENESS OF JAPANESE INFORMATION IN USA AND EUROPE

Western countries have been paying due attention to and reporting on Japanese information. According to Gibson and Kunkel [6], a vast Japanese information is reported in periodicals and technical reports. They observed that Japanese scientific and technical periodical literature is virtually inaccessible to western researchers and scientists unless it is indexed or abstracted by western indexing and abstracting services and only less than 20% of it is being covered by these services. They also observed that of the 75% that is written in Japanese, only 7% is covered. As there is no central service for gathering or disseminating technical reports in Japan and no abstracting or indexing service covers them comprehensively, they found it difficult to analyse the quality and quantity of this type of literature. Galinski [7] analysed the information flow between Europe and Japan and reported that the number of scientists in Europe with the knowledge of Japanese to evaluate Japanese information is so insufficient that there is an information deficit of 1:15 to the disadvantage of Europe. Togawa [8], after examining the trends in information processing in the Netherlands, calls for the revival of previous cooperation between the Neitherlands and Japan. According to Smith et al [9], although an awareness of the need to monitor Japanese literature is growing, a significant amount of

Japanese scientific, technical and commercial literature is still largely underused, the demand is biased towards journals with some level of English language information and the Japanese journals seeking to expand their relationship worldwide would need to increase their English language content, preferably to include English language articles or at least English abstracts.

In order to streamline the collection, management and utilisation of Japanese information, the British Library organised six seminars in 1980's and created the Japanese Information Service (JIS)section in May 1985. In the United States, several organisations (MIT, Smithsonian Institute,Office of the Naval Research, etc.) organised six seminars and workshops on Japanese information from 1983 to 1986 . Subsequently, the first International Conference on Japanese Information in Science, Technology and Commerce was organised in September 1987 in Warwick, UK by the JIS Section of the British Library and the University of Warwick Japanese Business Policy Unit with the support of NTIS (National Technical Information Service) and JICST (Japanese Information Centre for Science and Technology) [10] and the second conference on the same topic was organised in October1989 in Berlin, West Germany by the Gesellschaft fuer Mathematikund Datenverarbeitung, Japanisch Deutsches Zentrum Berlin and Staatsbibliothek Preussischer Kulturbesitz [11]. The first and the second conferences were attended by 194 and 150 participants respectively from the Government Agencies, Information Service Agencies, Libraries, Universities, Consultants, Industrial Information Groups, etc. from US, UK, Germany, France, etc. In both the conferences, an exhibition was set up near the meeting place so as to demonstrate various information services and exhibit the information products.

ACQUISITION, UTILISATION AND EVALUATION OF JAPANESE INFORMATION

In view of the scope of this paper, the acquisition and utilisation of Japanese information in Europe and USA, various problems faced by the western countries in the acquisition and utilisation of Japanese information and the role played by Japan in the internationalisation of Japanese information will be highlighted here.

The US Policy and Programmes with regard to the Acquisition, Utilisation and Evaluation of Japanese Information

In the Warwick Conference, it was reported that the US Government had started the collection of Japanese information in the latter half of 1970's. NTIS established contacts with JICST and the National Diet Library for the acquisition of information and in 1981 posted a representative in Tokyo for the collection of reports from the Government and private industrial R & D institutions for their own databases. These efforts were appreciated particularly in the light of the crisis caused by the striking fall in the competitive power of the American Industry because of the increasing trade deficit against Japan on the invasion of Japanese electronic goods and automobiles in the US.

Therefore, NTIS was directed to carry out full scale collection, evaluation and translation of Japanese documents, and budget of the National Science Foundation (NSF) for the execution of the US-Japan Research Cooperation Plan was doubled in 1987. In Berlin Conference, it was reported that the US policy indicated intensification of various activities, discussed in the Warwick Conference, for the acquisition and utilisation of Japanese information.

US Programmes for the acquisition and utilisation of Japanese information are given below.

(i) *NTIS Acquisition Programme :* The Programme, started in 1981, is being coordinated by the NTIS representative permanently posted in the Mitsubishi Sogo Kenkyujo, Tokyo. Its results are reflected by the increase in the number of Japanese documents inputted in the NTIS/GRA Database. However, the facilities in US for translating the primary Japanese documents, received under this programme, into English are not adequate. Nevertheless, there is great demand in US for these translations.

(ii) *Japanese Technical Information Research Service :* George Mason University, Fairfax, Virginia, in collaboration with NTIS started this service in September 1986, with the support of NSF, US-Japan Friendship Association etc.

(iii) *Japanese Technology Evaluation Programme :* NTIS and NSF entrusted this programme in 1984 to the Consultant Co., Santiago, California. New Materials, Computer Science, Mecatronics, Biotechnology, Telecommun- ication and Microelectronics have already been evaluated under this programme. Moreover, a large number of American scholars and technologists visit Japan for collecting Japanese information.

(iv) *Japan Initiative :* NSF started this programme in 1980 so as to send research scholars and language trainees to Japanese Universities and Government and private research institutions for undergoing more than six months training. In 1988, 30 persons were sent under this programme.

In addition to these programmes, various Government and private agencies are contributing to this activity in several ways. For example, under the "Japan Technical Literature Act" enforced in 1987, The Japan Technical Literature Office, Department of Commerce, is controlling the acquisitionand monitoring of Japanese information in the US. The American Board of Trade, located in Japan, constituted the High-Tech Committee in 1983 so as to monitor the Japanese technological developments. American Electronics Association and Motor and Equipment Manufacturers Association established their offices in Tokyo for the acquisition of Japanese information. Semiconductor Research Corporation and Microelectronics and Computer Technology Corporation have also started the acquisition and evaluation of Japanese information. National Academy of Science and Engineering established the office of Japan Affairs so as to promote cooperation between the academic bodies of the two countries in the utilisation of Japanese information.

Acquisition and Utilisation of Japanese Information in Europe

In UK, the British Library is responsible for the acquisition and dissemination of Japanese information. Its Document Supply Centre (DSC) receives 4,000 Japanese periodicals and has the collection of more than7,000 Japanese conference proceedings, reports, etc. Its JIS Section provides the Japanese information service in the form of document supply, reference service, online service,referral service, current awareness service, organisation of seminars and conferences, etc. [12]. For these services, the JIS uses the Japanese material procured at DSC and Japanese, American and European databases. The survey of demand for Japanese scientific and technical serial literature, conducted by the DSC of the British Library from 23rd September to 4th October 1985, revealed that, during this two week period, the total number of requests for Japanese serial literature was 1865, of which 704 came from overseas. This is approximately equivalentto an annual demand of 52,000 requests or 2.5% of the total demand for serials at DSC. A total of 562 different periodicals were requested during the two-week period which indicates a large number of unused Japanese periodicals.

In Germany,Universitaetsbibliothek der Technische Universitaetund Technische Informationsbibliothek, Hannover is recognised as centre for the acquisition and dissemination of Japanese information. Besides that, Zentralbibliothek der Medizin, Cologne, Dokumentationsstelle fuer Agrarpolitik, Landwirtschaft, Markt-wesen und Landische Soziologie, Bonn, Bibliothek des Instituts fuer Weltwirtschaft an derUniversitaet Kiel und Zentralbibliothek der Wirtschaftswissenschaften, Kiel, Staatsbibliothek Preussischer Kulturbesitz, Berlin and Bayerische Staatsbibliothek, Munich are procuring and disseminating Japanese information in their respective fields. Tokyo office of Gesellschaft fuer Information und Dokumentation (GID), established in 1977, monitors the exchange of information between Germany and Japan and introduces primary and secondary Japanese information sources to German libraries. The GID Tokyo office receives about 1100 requests annually (average of 1983-1986) from Germany.

In France, Centre Nationale de Recherche Scientifique / Centre de Documentation Scientifique et Technique (CNRS / CDST) established the Japanese Section (Cellule Japon) so as to manage the distribution of Japanese information within the country by carrying out online search of JICST databases. The same section is carrying out various other activities, such as Q & A, document supply, translation, publication of special Japanese information bulletins, etc. Presently, CDST library is receiving 600 Japanese periodicals. Recently, they have started procuring the JAPIO (Japanese Patent Information Organisation) and Nikkei Needs data. The Centre d'Etudes des Systemes et des Technologie Advancees (CESTA) established in 1982 is feeding Japanese information to the TELETEL Videotex which disseminates the information on advance technologies through public telephone network. This service, known as CESTEL, contains five files namely "EUREKA", "Crystel" and "DIDACTEL". The "Japan Weekly" is prepared by directly procuring the Nihon Keizai Shinbun, etc., extracting the relevant information and data, compiling them in French and then making videotext films.

Realising the fact that there is a lot of Japanese information that is not being used in Europe due to the language barrier and various other problems, the Japan-Info Project was startedin1986 [13]. This project financed from the budget of the Multilingual Action Programme, General Directorate 13, EEC, was taken on experimental basis for one year (from November 1986 to October 1987).

PROBLEMS IN ACQUISITION AND UTILISATION OF JAPANESE INFORMATION

Problems in acquisition and utilisation of Japanese information highlighted in the Warwick Conference can be discussed under the headings : language barrier, problems of translation, Japanese language training and personnel exchange programmes, preparation and use of secondary information sources, supply of primary documents, and use of Japanese databases.

It is recognised that, when foreigners try to access Japanese information, one of the problems they face is language barrier. This fact is further supported by the results of the survey of demand for Japanese scientific and technical serial literature conducted by the British Library mentioned earlier. The survey indicated that the demand is biased towards journals with some level of English language information. It has also been reported that even when Japanese scientists publish their work in western publications, they mostly cite the works published in Japanese language as a result of which the western users of Japanese information find it difficult to make use of these citations. Moreover, Japanese authors publish very little in English in the fields of administration, business, and technology. Therefore, it was voiced that publication of Japanese works accompanied by English summary and secondary journals containing abstracts of Japanese papers, reports, etc. should be encouraged.

Some of the typical problems related to translation are as follows. It is difficult to identify the romanised titles; as translation of titles of proceedings, etc. is incorrect , it is impossible to evaluate their contents; as location of English summary in Japanese publications is different from that in English publications , it is difficult (for those who cannot read Japanese) to identify it with the original paper; romanisation of the terms given in Katakana makes their identification with the original language impossible, and the number of Japanese translators with good scientific and technical background is very small. Therefore, it was voiced to expedite the applications of machine translation. Moreover, it has been feared that acquisition of Japanese information on the basis of translations only may be risky, because the user may not be able to evaluate the contents of the translated Japanese document and direct translations do not communicate the message hidden in the style of writing and conversation.

In view of the language barrier and problems of translation, the attention was focussed on Japanese language training and personnel exchange programmes. It was observed that the existing Japanese language training programmes were biased towards Oriental culture and fine arts and the beginning had just been made to organise the language training programmes required for promoting acquisition and utilisation of Japanese scientific, technical and commercial information. It was also voiced that more science and engineering graduates, particularly in the younger age group, should be recruited and motivated for going to Japanese research institutions and industrial units for undergoing language training under the conditions prevailing for Japanese students/trainees themselves. It was reported that, although Japan has offered ample opportunities to American scientists, technicians and engineering graduates for undergoing the required training in Japan under different exchange programmes, it has been difficult to find sufficient number of persons fulfilling the prerequisites (the research theme suitable for their induction in Japanese institutions and their Japanese language background) of these exchange programmes.

It was reported that over the years big libraries in each country have raised a very good collection of Japanese documents, but the access to the information contained in these documents for practical use is not easy because of inadequate preparation and circulation of secondary Japanese information sources and databases. Precisely, as reported in the Warwick Conference, the secondary information service (including secondary information databases) covering Japanese gray literature had been delayed, there was no abstracting service covering Japanese commercial information and the number of Japanese business journals covered by ABI/INFORM and PTS PROMT was very small. Consequently, they face difficulties in procuring the Japanese Industrial Standards, pharmaceutical literature, trade information covered by business magazines, statistical data of Government Departments released in the form of pamphlets and annual reports of the unlisted industial units. The need for accessing Japanese secondary information databases (in Japanese language) was also highlighted.

The Western countries, which took lead in the development of online databases, have identified a number of problems which they face in accessing Japanese scientific, technical and business databases. For example, the development of gray literature databases in Japan is quite late. There is almost no database on technical reports, memoirs, theses and business documents as a result of which their access is very difficult. There is a lot of overlapping in between the existing European and American databases and newly developed Japanese technical information databases. As Katakana portion in the JAPIO databases being offered in English by Japan is romanised, it becomes impossible to find out spellings of the original terms. As the hardware with Kana-Kanji options, which is indispensable for using the databases in Japanese language, is not sold out of Japan, its procurement is difficult. Use of the databases in Japanese language poses the problem of the mixed code system for English alphabets, Katakana and Kanji. If Japanese machines are imported for using the databases in Japanese language, their (of Japanese machines) maintenance becomes a problem. Besides that there are a number of problems like the need for the development of an interface for making the Japanese computer hardware and software compatible to the foreign systems, finding out solution to the problems related to the accessing of Japanese databases on Japanese network through International Telecommunication system, etc.

JAPAN'S ROLE IN THE INTERNATIONALISATION OF JAPANESE INFORMATION

In order to meet the demand for Japanese information in the Western World and extend cooperation in finding out the solutions to the problems discussed in previous section, various Japanese information organisations such as JICST, JAPIO, Gakujutsu Joho Senta (Technical Information Centre), the National Diet Library, etc. have been working for the internationalisation of Japanese information

[11], [14], [15]. A brief account of some of the important services offered by these organisations and reported in the Berlin Conference is given below.

JICST is offering the English Database (JICST - E File) service through STN International and JOIS, promoting the distribution of gray literature, bringing out English publications and developing the machine translation system. The JICST - E File is being expanded and updated every year. In 1988, it covered about 81.5% documents produced in Japan and 24,000 English articles (about 12% of JICST - E File) and contained English abstracts constituting about 31.5% of its total content. In 1989, JICST started translating relevant portions of its Japanese File into English and merging the translated portion into the JICST - E File. In order to promote the distribution of gray literature, JICST collects the information on relevant documents and puts into the JICST - E File. It constitutes about 40% of the English File. The English publications brought out by by JICST are : Current Science and Technical Research in Japan, Electronics and Communications in Japan, Energy Technology in Japan, JICST English Version Thesaurus, 1987 and JICST Classification Table 1987. In 1989, the JICST Machine Translation System contained about3,000 grammar rules, the translation dictionary consisting of about 3,00,000 terms and 100 abstracts for evaluation.

JAPIO is supporting the Patent Abstracts of Japan (PAJ), world Patent Index (WPI) and International Patent Documentation (INPADOC) so as to promote the dissemination of Japanese patent information in English. PAJ Online Service is being offered in the form of JAPIO file through Pergamon Orbit Infoline. The WPI, producedby Derwent, includes every week about 4,800 records on Japanese patents received through PAJ. It can be accessed through Dialog. Pergamon Orbit and Telesystem - Questel.

The Technical Information Centre is offering its databases to USA through a private communication line set up between this centre and NSF. It proposes to offer the similar service to UK, through British Library and to other European countries through their respective information centres. The National Diet Library, with the rich collection of books, journals, Government publications, theses, conference proceedings, etc. provides various services to users like reading, document supply, indirect lending, reference service, etc. within as well as outside Japan.

Besides that, a number of database producers and distributors are supporting the internationalisation of Japanese databases. According to the Ministry of International Trade and Industry (MITI) Database Register, in 1982 there were only 122 Japanese databases. By 1988, their number increased to 528 which constitute about 26.9% of the total number of databases (1964) being accessed in Japan. As regards the internationalisation of Japanese databases, in 1987, only 28 Japanese databases could be accessed from other countries. By 1989, this number increased to 104.

INDIAN SCENE

There has been considerable awareness of Japanese information in India too. As early as in 1970's India had a reasonable translation potential to provide Japanese-English scientific and technical translation service to NSF after meeting the domestic demand to a considerable extent. In order to assess the demand for scientific and technical translation in India, Indian Scientific Translators Association (ISTA) conducted the National Survey in 1980 with the support of DST (Department of Science and Technology) [16]. In 1980, Jawaharlal Nehru University (JNU) organised a workshop in collaboration with DST inviting scientists, language experts, specialists in documentation and translation to focus their attention on the problems and prospects of scientific translation from Japanese [17] and in 1988, the Monbusho Scholars Association of India (MOSAI), JNU and NISTADS (National Institute of Science, Technology & Development Studies) organised the Workshop on Indo- Japanese Cooperation in Science & Technology with the support of DST, CSIR (Council of Scientific and Industrial Research), UGC (University Grants Commission) and Japan Cultural & Information Centre. Under the agreement between the Government of Japan and the Government of India for Cooperation in Science & Technology signed in 1985, the India-Japan Joint Committee periodically reviews the exchange programmes and gives appropriate recommendations for further action. Some of the areas for cooperation identified by the joint committee are :

(i) disaster prediction and prevention including earthquakes, cyclones and floods;

(ii) weather pridiction and monsoon research;

(iii) tissue culture;

(iv) vaccines and immunodiagnostics;

(v) research on standards;

(vi) recycling technologies;

(vii) assessment of technology for air and water pollution;

(viii) material research; and

(ix) studies on genetic resources [18].

India is quite conscious of the revolutionary changes taking place both in technology information as well as in information technology and of the importance of Japanese information and poised for keeping pace with the latest developments in these fields. Recent trends in the development of indigenous databases so as to meet our domestic demand and reduce dependence on foreign databases to the extent it is possible and establishment of (TIFAC) Technology Information Forecasting and Assessment Council are indicative of it. Therefore, it may be quite appropriate to look into the experiences of the Western World and derive the points relevant to our planning and implementation of the policy on the acquisition and utilisation of Japanese information.

CONCLUSION

Analysis of the awareness, acquisition and utilisation of Japanese information in USA and Europe leads to the following conclusions.

(i) The Western World is poised to collect every bit of Japanese information so as to keep pace with the technological devolopments in Japan.

(ii) Both USA and Europe have launched a number of programmes for the acquisition of Japanese information, particularly the gray literature.

(iii) Japan is also promoting the internationalisation of Japanese information by increasing English content in their primary and secondary publications and databases and developing the Japanese-English machine translation system.

(iv) There is shortage of trained scientific and technical manpower, both in USA and Europe, required for handling Japanese information.

(v) The other problems faced by the Western World in accessing Japanese information include the non-availability of Japanese hardware and software necessary for accessing Japanese databases.

(vi) Recent efforts made by USA, Europe and Japan have improved the flow of Japanese information to the Western World. The number of Japanese databases accessible from other countries has increased from 28 in 1987 to 104 in 1989.

(vii) There has been considerable awareness of Japanese information in India too.

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PATTERN OF INFORMATION USE BY INDIAN SURGICAL SCIENTISTS – A CITATION STUDY

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Discusses the pattern of information use by researchers in the field of surgery as indicated by citations in the M.S. Dissertations submitted to the Gulbarga University, Gulbarga during 1982-1989. Identifies the use of different sources of information, their languages, countries of origin and subjects. States the obsolescence of literature and lastly applies Bradford's Law of Scattering. The findings of the study have implications for the development of need based collection in library and Information centres in the field of surgery.

INTRODUCTION

The need for information support to education, research and practice in medicine has been felt and recognised in the world for the past several decades. User studies to ascertain the pattern of information use by scientists are important in planning and designing of information systems and services. User studies reported from all over the world in the field of science and technology are more in number than those in medical sciences. Some of the notable studies from India are by Neelameghan [1], Sen et al. [2], Vetal [3], Luthra [4] and Sengupta [5,6,7,8,9,10]. A number of studies have also been conducted by the students of M.L.I.Sc., M.Phil. and Ph.D. of various Indian universities. The present paper attempts to study the pattern of information use by researchers in the field of surgery. It is based on references appended in M.S. dissertations accepted by the Gulbarga University, Gulbarga, during 1982-1989.

OBJECTIVES

The objectives of the present study include the identification of

i). major sources of information;

ii). core journals;

iii). language, subject and the country of origin of the cited document;

iv). rate of obsolescence of literature; and

v). the extent of applicability of Bradford's law of scattering to the pattern of journal use by Indian scientists in the field of surgery.

METHODOLOGY

The methodology chosen for this study is based on the analysis of foot-notes and bibliographic references appended to 145 M.S. dissertations accepted by the Gulbarga University, Gulbarga during 1982-1989. The total number of citations are 7,576 (Table 1). The study does not take into consideration how far a certain piece of information is useful or a particular citation relevant to the central theme of the citing document. The emphasis is largely on the quantity, form and age of citations rather than on the subject content and the degree of its relevance to the citing document.

DISCUSSION AND RESULT

Average Citations per Dissertation

During 1982-1989, 145 M.S. dissertations were accepted by the Gulbarga University, Gulbarga. These dissertations contained 7,576 citations, with an average of 52 articles per dissertation (Table 1). In the case of social sciences, it is entirely different. Karisiddappa and Sangam's [11] study reveals that the average number of references per dissertation

Table 1

The Source Data

Year	No. of Disser-tation	No. of Citations	Cumulative Citations	Per-centage	Cumulative Percentage
1982	13	909	909	12.00	12.00
1983	16	894	1803	11.80	23.80
1984	16	933	2736	12.32	36.11
1985	17	901	3637	11.89	48.01
1986	18	945	4582	12.47	60.48
1987	29	927	5509	12.24	72.71
1988	18	988	6497	13.04	85.76
1989	18	1079	7576	14.24	100.00
Total	145	7576		100.00	

in political science, sociology, anthropology, geography, commerce, history and economics are 123, 132, 141, 158, 161, 173, 182 and 184 respectively. These figures reveal the fact that the surgical scientists depend much on the practical work done in the hospital or laboratory whereas social scientists depend entirely on library resources.

Type, Subject, Language and Origin of Information Sources

The major sources of information used by the researchers in the field of surgery comprised journal articles which accounted for 54.23% of the total citations (Table 2) followed by books (35.39%), conference papers (5%), reports (3.7%) and theses (1.6%). Unlike the researchers in various fields of social sciences, who depend more on books [11], researchers in surgery depend more on journal articles, corroborating earlier findings in related disciplines.

Further, the citations were analysed according to their language, country and subject. The language-wise scattering of cited documents showed that English was the predominant language and the use of other foreign language materials was substantially lower. Russian language documents accounted for only 0.09% of citations (Table 3).

The cited documents were analysed according to their country of origin. Table 4 indicates that 41.71% of the cited documents were from USA and rest were from UK (28.45%), India

Table 2

Major Sources of Literature used by Surgical Scientists

Sl. No.	Form of Document	No. of Citations	Cumulative Citations	Per-centage	Cumulative percentage
1.	Periodicals	4109	4109	54.237	54.237
2.	Books	2681	6790	35.388	89.625
3.	Conference papers	379	7169	5.003	94.628
4.	Reports	281	7450	3.709	98.337
5.	Theses	126	7576	1.663	100.000

Table 3

Language-wise Distribution of Cited Journal Articles

Sl. No.	Language	No. of Citations	Cumulative Citations	Percentage	Cumulative Percentage
1.	English	4100	4100	99.781	99.781
2.	Russian	4	4104	0.097	99.878
3.	French	2	4106	0.049	99.927
4.	German	2	4108	0.049	99.976
5.	Arabic	1	4109	0.024	100.000

Table 4

Country-wise Distribution of Cited Journal Articles

Sl. No.	Name of the Country	No. of Citations	Cumulative Citations	Percentage	Cumulative Percentage
1.	U.S.A	1714	1714	41.713	41.713
2.	U.K.	1169	2883	28.450	70.163
3.	India	1084	3967	26.381	96.544
4.	U.S.S.R	46	4013	1.119	97.664
5.	Hongkong	22	4035	0.535	98.199
6.	Sweden	16	4051	0.389	98.588
7.	Australia	11	4062	0.268	98.856
8.	France	9	4071	0.219	99.075
9.	Belgium	7	4078	0.170	99.246
10.	Japan	7	4085	0.170	99.416
11.	Netherland	6	4091	0.146	99.562
12.	Brazil	3	4094	0.073	99.635
13.	Norway	3	4097	0.073	99.708
14.	Germany	2	4099	0.049	99.757
15.	Canada	2	4101	0.049	99.805
16.	China	1	4102	0.024	99.830
17.	Ireland	1	4103	0.024	99.854
18.	Jordan	1	4101	0.024	99.878
19.	Korea	1	4105	0.024	99.903
20.	Cuba	1	4106	0.024	99.927
21.	Poland	1	4107	0.024	99.951
22.	Romania	1	4108	0.024	99.976
23.	Uganda	1	4109	0.024	100.000

(26.38%) and remaining i.e. less than 4% were from other 20 countries. From this it can be inferred that the Indian researchers in surgery depend much on literature emanating from USA and UK.

Subject-wise scattering of references (Table 5) showed that 55.82% of the cited documents were from the field of surgery. The journal articles devoted to subjects other than surgery accounted for nearly 54.18% of the (Table 5) total cited literature. This has an important implication for the provision of information services to surgical scientists in India.

Table 5

Subjectwise Breakup of Journal Cited Articles

Sl. No.	Subject	No. of Citations	Cumulative Citations	Per-centage	Cumulative Percentage
1.	General Surgery	678	678	16.500	16.500
2.	Surgical Clinic	581	1259	14.140	30.640
3.	Cancer	358	1617	8.713	39.353
4.	Plastic Surgery	353	1970	8.591	47.944
5.	Liver Surgery	289	2259	7.033	54.977
6.	Urology	253	2512	6.157	61.134
7.	Surgical Ocology	204	2716	4.965	66.099
8.	Neuro Surgery	189	2905	4.600	70.698
9.	Immunology	165	3070	4.016	74.714
10.	Chest Disease	163	3233	3.967	78.681
11.	Tuberculosis	149	3382	3.626	82.307
12.	Gynaecology	125	3507	3.042	85.349
13.	Paediatrics	109	3616	2.653	88.002
14.	Rhinology and Laryngology	98	3714	2.385	90.387
15.	Respiratory Diseases	98	3812	2.385	92.772
16.	Medicine and Hygiene	84	3896	2.044	94.816
17.	Endocrinology	78	3974	1.898	96.715
18.	Malariology	65	4039	1.582	98.296
19.	Otologology	47	4086	1.144	99.440
20.	Radiology	23	4109	0.560	100.000

Most Frequently Cited Journals

Table 6 gives the rank list of journals used by the surgical scientists. It is observed that the first five journals received more than 70% and the remaining 149 journals received only 30% of the total number of citations. Among the cited journals Indian Journal of Surgery occupies the first rank, accounting for 20.88% of total number of citations followed by the British Journal of Surgery (20.51%) and the American Journal of Surgery (15.03%). The selection of periodicals for subscription may be based on the rank list for optimum utilisation.

Obsolescence of Literature

Table 7 gives the chronological dispersion of the cited articles in the field of surgery. The rate of obsole- scence of literature based on citation analysis gives an indication of to what extent a search must go back to obtain a representative sample of the published literature in a given field. It is observed that documents as old as 88 years have been cited. The data was plotted on a plain graph paper taking cumulative citations vs.age of publication (Fig.1). The half life of cited journal literature is observed to be 12 years. This has got direct relevance in the organisation and storage of materials in libraries.

Bradford's Law of Scattering and Pattern of Journal Use by Surgical Scientists

The data obtained in the study and tabulated in Table 8 is used for testing Bradford's Law of

Table 6

Most Frequently Cited Journals by Surgical Scientists

Sl. No.	Rank No.	Name of the Journal	Language and country	No.of Citations	Cumulative Citations	Percentage	Cumulative percentage
1	1	Indian Journal of surgery	Eng.,India	858	858	20.88	20.88
2	2	British Journal of Surgery	Eng.,U.K	843	1701	20.52	41.40
3	3	American Journal of Surgery	Eng.,US	637	2338	15.50	56.90
4	4	American Journal of Cosmetic Surgery	Eng.,US	463	2801	11.27	68.17
5	5	British Journal of Urology	Eng.,U.K	110	2911	2.68	70.85
6	6	Journal of Indian Medical Association	Eng., India	95	3006	2.31	73.16
7	7	Cancer	Eng.,US	81	3087	1.97	75.13
8	8	Journal of Applied Medicine	Eng.,US	39	3126	0.95	76.08
9	9	New England Journal of Medicine	Eng.,US	38	3164	0.92	77.00
10	10	Indian Journal of Cancer	Eng., India	36	3200	0.88	77.88
11	11	Surgery of Gynaecology and Obstetrics	Eng., USSR	35	3235	0.85	78.73
12	12	Surgery	Eng., U.K	34	3269	0.83	79.56
13	13	American Journal of Urology	Eng., U.S	31	3300	0.75	80.31
14	14	Archives of Surgery	Eng., US	30	3330	0.73	81.04
15	15	Journal of Laryngology and Otology	Eng., UK	28	3358	0.68	81.72
16	15	Surgical Clinics of North America	Eng.,US	28	3386	0.68	82.40
17	16	British Journal of Cancer	Eng.,UK	27	3413	0.66	83.06
18	17	British Journal of Radiology	Eng.,UK	22	3435	0.53	83.59
19	17	Journal of Paediatrics	Eng., Hongkong	22	3457	0.53	84.12
20	18	American Journal of Medical Sciences	Eng.,US	18	3475	0.44	84.56
21	19	American Journal of Medicine	Eng.,US	17	3492	0.41	84.97
22	19	Postgraduate Medical Journal	Eng.,UK	17	3509	0.41	85.83
23	20	American Journal of Gastro-enterology	Eng.,US	16	3525	0.39	85.77
24	20	Archives of Otolaryngology	Eng.,US	16	3541	0.39	86.16
25	20	Lancet	Eng.,US	16	3557	0.39	86.55
26	21	American Journal of Clinical Pathology	Eng.,US	15	3572	0.37	86.92
27	21	International Journal of Surgery	Eng.,US	15	3587	0.37	87.29
28	21	Journal of Postgraduate Medicine	Eng.,India	15	3602	0.37	87.66
29	22	American Journal of Obstetrics	Eng.,US	14	3616	0.34	88.00
30	22	American Journal of Rodent genology	Eng.US	14	3630	0.34	88.34
31	23	American Journal of Diseases of Children	Eng.,US	13	3643	0.33	88.66
32	23	British Journal of Plastic Surgery	Eng., UK	13	3656	0.32	88.98
33	23	Journal of Medical Research	Eng., US	13	3669	0.30	89.30
34	24	American Journal of Cancer	Eng., US	12	3681	0.29	89.59
35	24	American Journal of Radiology	Eng., US	12	3693	0.29	89.88
36	24	Cancer Research	Eng., US	12	3705	0.92	90.17
37	24	Indian Journal of Paediatrics	Eng., India	12	3717	0.29	90.46
38	24	Indian Journal of Tuberculosis	Eng., US	12	3729	0.29	90.75
39	25	American Journal of Dermatology-and Genito-Urinary Diseases	Eng., US	10	3739	0.24	91.00
40		115 Journals having less then 10 citations each		370	4109	9.00	100.00
		Total		4109		100.00	

Table 7

Chronological Scattering of Cited Journal Articles

Age in years	No. of Citations	Cumulative Citations	Per-centage	Cumulative Percentage	Citation in Tail T (t)
0	11	11	0.27	0.27	4109
1	47	58	1.14	1.41	4098
2	63	121	1.53	2.94	4051
3	89	210	2.17	5.11	3988
4	126	336	3.07	8.18	3899
5	117	453	2.85	11.02	3773
6	183	636	4.45	15.48	3656
7	215	851	5.23	20.71	3473
8	248	1099	6.04	26.75	3258
9	227	1326	5.52	32.27	3010
10	249	1575	6.06	38.33	2783
11	236	1811	5.74	44.07	2534
12	239	2050	5.82	49.89	2298
13	186	2236	4.53	54.42	2059
14	199	2435	4.84	59.26	1873
15	170	2605	4.14	63.40	1674
16	145	2750	3.53	66.93	1504
17	145	2895	3.53	70.46	1359
18	113	3008	2.75	73.21	1214
19	97	3105	2.36	75.57	1101
20	86	3191	2.09	77.66	1004
21	93	3284	2.26	79.92	918
22	61	3345	1.48	81.41	825
23	62	3407	1.51	82.92	764
24	49	3456	1.19	84.11	702
25	53	3509	1.29	85.40	653
26	41	3550	1.00	86.40	600
27	33	3583	0.80	87.20	559
28	32	3615	0.78	87.98	526
29	34	3649	0.83	88.81	494
30	29	3678	0.71	89.51	460
31	31	3709	0.75	90.27	431
32	21	3730	0.51	90.78	400
33	16	3746	0.39	91.17	379
34	17	3763	0.41	91.58	363
35	13	3776	0.32	91.90	346
36	14	3790	0.34	92.24	333
37	9	3799	0.22	92.46	319
38	8	3807	0.19	92.65	310
39-43	36	3843	0.88	93.53	302
44-48	36	3879	0.88	94.40	266
49-53	33	3912	0.80	95.21	230
54-58	28	3940	0.68	95.89	197

(contd.)

Age in years	No. of Citations	Cumulative Citations	Per-centage	Cumulative Percentage	Citation in Tail T (t)
59-63	29	3969	0.71	96.59	169
66-68	24	3993	0.58	97.18	140
69-73	23	4016	0.56	97.74	116
74-78	18	4034	0.44	98.17	93
79-83	17	4051	0.41	98.59	75
84-88	13	4064	0.32	98.90	58

Table 8

Data for the Application of Bradford's Law

Rank No.	No. of Citations	No. of Journals	Total No. of Citations	Cumulative No. Citations
1	858	1	858	858
2	843	1	843	1701
3	637	1	637	2338
4	463	1	463	2801
5	110	1	110	2911
6	95	1	95	3006
7	81	1	81	3087
8	39	1	39	3126
9	38	1	38	3164
10	36	1	36	3200
11	35	1	35	3235
12	34	1	34	3269
13	31	1	31	3300
14	30	1	30	3330
15	28	2	56	3386
16	27	1	27	3413
17	22	2	44	3457
18	18	1	18	3475
19	17	2	34	3509
20	16	3	48	3557
21	15	3	45	3602
22	14	2	28	3630
23	13	3	39	3669
24	12	5	60	3729
25	10	1	10	3739
26	9	8	72	3811
27	8	3	24	3835
28	7	6	42	3877
29	6	6	36	3913
30	5	4	20	3933
31	4	15	60	3993
32	3	8	24	4017
33	2	27	54	4071
34	1	38	38	4109

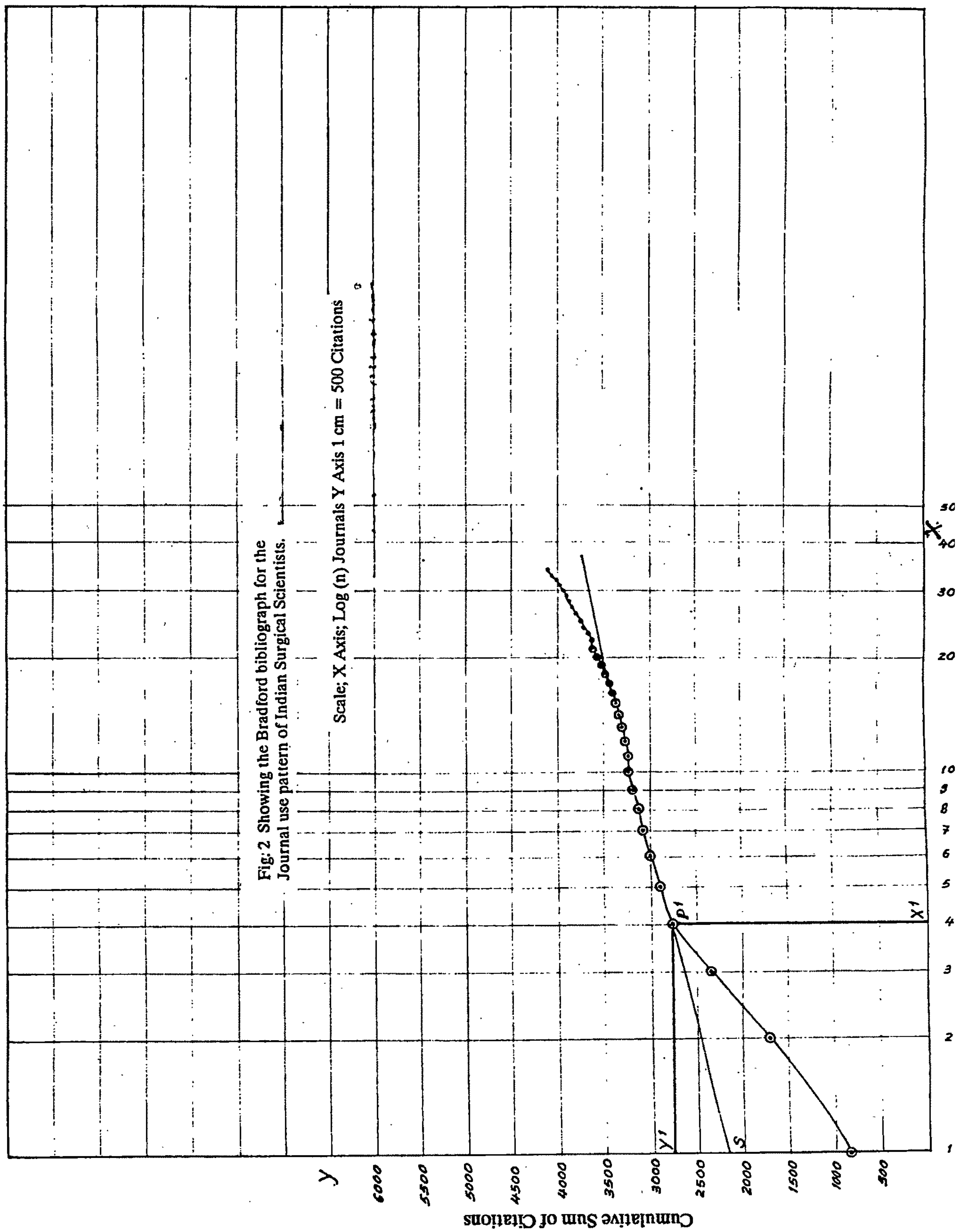

Fig. 2 Showing the Bradford bibliograph for the Journal use pattern of Indian Surgical Scientists.

Scale; X Axis; Log (n) Journals Y Axis 1 cm = 500 Citations

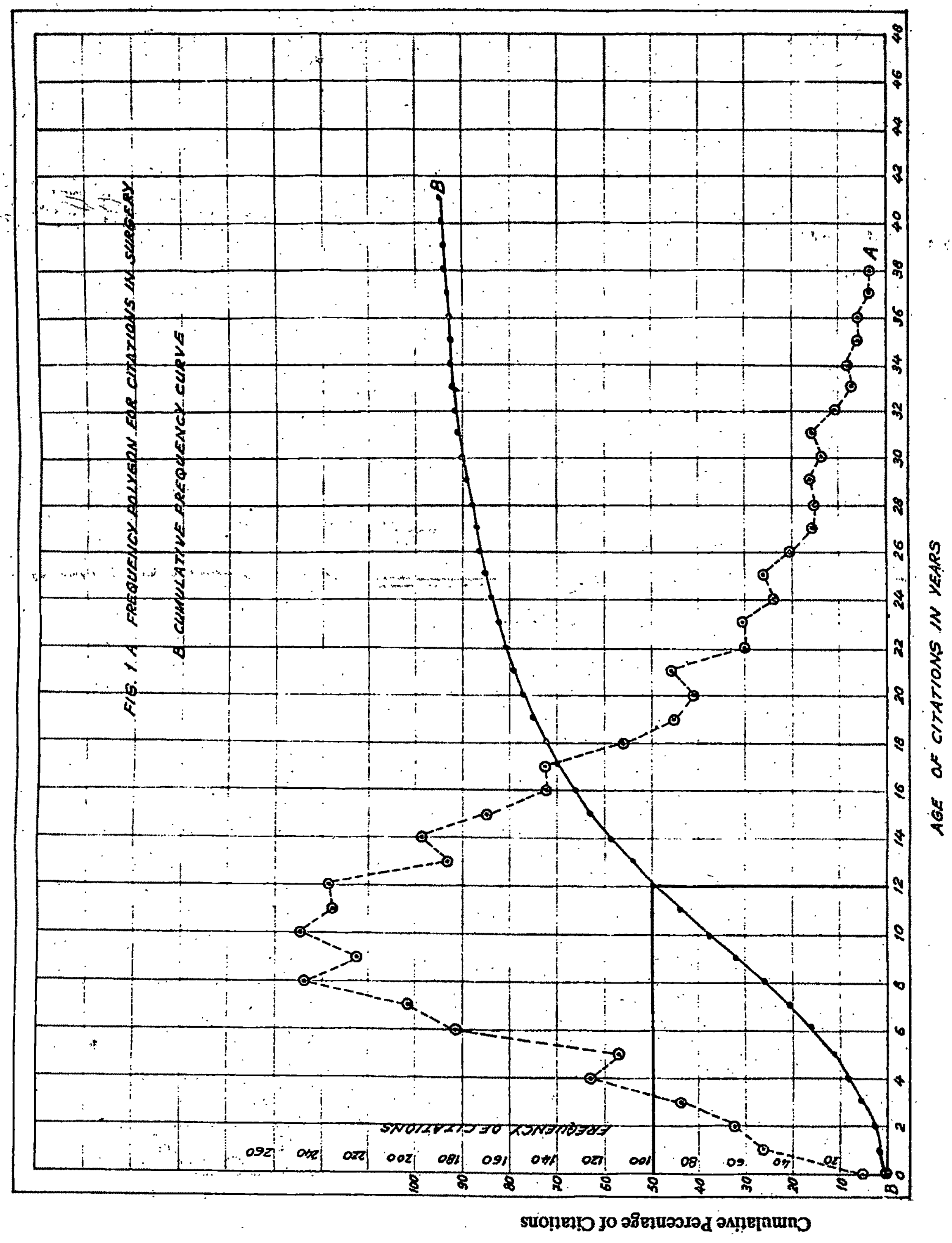

FIG. 1 A FREQUENCY POLYGON FOR CITATIONS IN SURGERY
B CUMULATIVE FREQUENCY CURVE

Scattering. The graph was plotted on a semilog graph paper taking cumulative sum of articles {R (n)} on the x-axis vs.the log of the cumulative sum of journals on the y-axis (Fig.2). This is not found to be in conformity with Bradford's hyperbolic curve. Therefore, it is concluded that the pattern of journal use by surgical scientists is not in accordance with the law of scattering. This may be due to the heavy concentration of few periodicals, hence further zones could not be drawn.

CONCLUSION

Following are some of the important findings of the study:

a) periodical articles are the major source of Information,

b) the publications in English language are used maximum,

c) maximum number of citations are to the publications from USA (41.71%),

d) first five journals account for more than 70% of the cited literature,

e) 'Indian Journal of Surgery' occupies the first rank, and

f) the pattern of journal use by surgical scientists is not in accordance with Bradford's Law of Scattering.

The findings of the study have great implications for the need based collection development in the field of surgery.

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SDI SERVICE ON PATENTS – A CASE STUDY OF USING ONLINE SYSTEMS

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Briefly explains the value of patents in industrial environment. Highlights the advantages of using Online System i.e., DIALOG for offering efficient SDI Service on patents. Describes systematically the procedures involved in initiating such a service. Gives cost particulars and concludes that the success of SDI service depends on proper user-system interaction.

INTRODUCTION

Patents are the vital source of information in industrial world. They are the first document in which a technological innovation is reported in detail, and hence indispensable sources of information for engineers and research workers. The use of patent information helps to avoid costly and unnecessary duplication of development efforts. Therefore, SDI service for patent information is offered to the readers/researchers in Kirloskar Electric Co. Ltd.(KEC) on regular basis from January 1984.

SDI SERVICE ON PATENTS

'World Patent Index' (WPI) database of Derwent publications, UK, is an ideal source of information for providing SDI Service on patent information. Initially 'WPI Gazette', a weekly publication of Derwent, UK, was consulted as a source of information. After the introduction of 'World Patent Index' database in the DIALOG Information System, California, USA, in January 1985, a new era of prompt and highly sophisticated SDI service to the readers has started.

Online system for SDI service has following features:

- — Construction of profile and its modification on the basis of the results obtained at various stages of search.
- — Facility of multipoint access to data through inventor, patent assignee, title, abstract, international classification number, etc.
- — Possibility of complex searches involving large number of terms.
- — Facility for revising the profiles.
- — Use of simple command language.
- — User friendliness.
- — Saving in user's time.

KEC started building the SDI profile with DIALOG in July 1985 with 'World Patent Index' as the source database. Initially the profile covered only 7 research topics which were later extented to 9.

PROCEDURE

The operation of SDI service involves following steps:

- — Profile construction.
- — Entering of SDI profile in DIALOG.
- — Circulation of SDI notifications and analysis of feedback.
- — Revision of search profile whenever necessary.

The construction of profile is an important step. Ideally there should be one profile for each research topic. But for the reasons of economy a group profile was designed for the readers having common interest. For profile construction, following steps are followed.

Search Request: A standard proforma (Appendix-A) was designed to receive search requests from readers. Some of the readers desired to get retrospective information also on the topics noted for SDI service. A common form is used for both the purposes. Forms are filled by the readers with the help of the library staff.

Search Aids: Most of the online systems and individual databases provide search aids to help users in systematic construction of profiles and carry out search operations. Some of the important search aids required for patent SDI service are listed below:

— Guide to DIALOG Searching (GDS): A loose-leaf binder containing database chapters and a few examples of conducted searches.

— Chronolog: A monthly newsletter of DIALOG which notifies additions/deletions, cost variations and search facilities in various databases.

— International Patent Classification (IPC), 4th edition, 1985.

— Derwent Patents Manual - General (1985): Instruction manual 1A

— Company Code Manual (1985) (Derwent) in two parts comprising 13,700 standard companies and their codes.

It is essential to keep up-to-date search aids by incorporating the revisions, additions and deletions etc. regularly.

Search Topic Analysis: The topics suggested by readers for SDI service are analysed into concepts. All possible synonyms and spelling variations are checked and listed.

Example : Sinusoidal pulse width modulated variable frequency inverter fed induction motor drives.

Concept A

INVERTER
INVERTERS
INVERTOR
INVERTORS

Concept B

PULSE WIDTH MODULATION
PULSE WIDTH MDULATE
PULSE WIDTH MODULATED
PULSE WIDTH MODULATING
P W M

Concept C

SINUSOIDAL
VARIABLE FREQUENCY
VARYING FREQUENCY

Concept D

A C MOTOR/S
INDUCTION MOTOR/S
MOTOR DRIVE/S
ASYNCHRONOUS MOTOR/S

Relevent dictionaries, thesauri and at least one or two sample patents on each SDI topic in question are studied to derive all possible concepts or key terms. A Similar analysis is carried out with respect to rest of the SDI topics.

Search Strategy Formulation: In this step the concepts or key terms are combined using logical operators 'AND', 'OR', 'NOT' into a search statement [2] Some of the words are truncated to reduce the length of the search statement and increase the recall. A search strategy for the example stated above, is demonstrated as follows:

INVERT?R? AND (PULSE(W)WIDTH(W)MODULAT? OR PWM) AND (SINUSOIDAL OR VAR?(W) FREQUEN? AND (MOTOR? OR DRIVE?)

A decision has to be taken to present the concepts in standard terms accurately. As the search process is heuristic in nature it is usual practice to prepare a 'first try' search statement and improve the out put in subsequent steps. Provision of few additional steps is also kept to broaden or narrow down the search output.

TERMINAL OPERATIONS

The searcher has to get ready with the homework of quick interaction with the terminal. The telex is used as the communication media for conducting online search. At first the telex call is made to Gateway Centre in New York on Low Speed Data Service (LSDS) line through Madras International Telex Exchange [1]. After getting 'GA' (Go Ahead) response from the system, name of one of the American networks such as, TYMNET, TELENET OR DIALNET is entered to access DIALOG. Online systems recognise their users only by the secret passwords assigned to them. Hence, the password has to be entered correctly before opening any file for searching. Once online with DIALOG, the required file is opened and searched. In the present case the 'World Patent Index' CURRENT FILE No. 351 (1981 to present) is opened and searched. Since there is a common concept 'Inverter' in all the SDI topics, the records containing the same are first sorted out. The operations held at this stage are reproduced as follows:

```
? S INVERT?R?
        SI 12263 INVERT?R?
? S SI NOT (IC=H03? OR IC=H04)
        S2 9272 SI NOT (IC=H03?
        OR IC=H04?)
? S S2 AND IC=H02M?
        S3 3271 S2 AND IC = H02M?
```

In step 2, records relating to following subjects are eliminated using the logical operator 'NOT' in conjunction with the Step 1.

Subjects	Corresponding IPC Numbers
-Electronic circuitry,	ICS H03
Telecommunication Engineering	HO4

As the output in step 3 is too small for getting weekly SDI notifications, step 2 is considerd the base for further combinations.

The search operations held for first topic are given below.

```
?S PULSE(W)WIDTH(W)MODULAT?
   OR PWM
  S4 2152 PULSE(W)WIDTH(W)MOD-
  ULAT? OR PWM
?S S4 AND (MOTOR? OR DRIVE?)
  S5 716 S4 AND (MOTOR? OR DRIVE?)
?S S5 AND (SINUSOIDAL OR VAR?-
(W)FREQUENC?)
  S6 18 S5 AND (SINUSOIDAL OR VAR?-
  (W)FREQUENC?)
?S S5/DE
  S7 118 S5/DE
?C 2 AND 7
  S8 34 2 AND 7
```

For convenience it is usual practice to start the search with full text terms and limit the output by classification numbers, descriptors, etc. at a later stage. The descriptor combination is made in step 5 but it is learnt that the output is too small. Similarly step 6 too has led to very low output. Hence, steps 6, 7 and 8 are ignored and search process continued.

```
?C  2 AND 5
  S9 210 2 AND 5
```

The remaining 6 topics were searched on similar lines and finally a set number 50 is arrived at. The same is used for storing the search strategy with DIALOG for SDI service.

Example:

```
?PR 50/5/1-50
PRO15;PRINT 50/5(ITEMS 1-50) EST.
COST OF DLRS.25.00
?SAVE SDI
SDI "PB001" STORED
LOGOFF
```

The flow chart indicating various steps involved in a search is given in Appendix-B. The use of commands such as "EXPAND" are avoided as they take too much of telex time and come out to be very expensive.

The printed version of thesaurus is used instead of the online one for economical reasons.

REVISION OF PROFILE

Weekly notifications of the SDI profile were circulated to the end users with a request to cross mark(x) the patent titles which are irrelevent to any of the SDI topics. The feed-backs from users were analysed during the first four weeks of the profile construction. The profile was revised accordingly during the 5th week. Some of the sections of the profile are revised to reduce the retrieval noise. The combination of 'NOT' operator was used to eliminate the topics which were the root cause of the retrieval noise.

RECALL AND PRECISION

The use of non-standard terms initially led to retrieval of highly specific documents. But this caused poor recall and low precision. Hence, a suitable combination of IPC numbers, descriptors and non-standard terms was worked out at the time of revision of profile which subsequently raised the SDI outputs from 60% to 80%. The recall and precision are inversely proportional to each other [3] and, therefore, it is difficult to reach an ideal stage. The users of SDI profile are entitled to receive a minimum of 25 references per week. Hence, the recall was adjusted to be around 25 ref/week for the reasons of economy.

COST

The cost of SDI service depends on following factors.

- Telex time
- Computer time
- Number of records printed

The cost of telex time and computer time are involved only at the time of profile construction and its revision. A minimum of US$ 6.25 are charged for first 25 references and US$0.5 for each subsequent reference. The customers are billed by DIALOG once a month. A detailed cost analysis is presented in Appendix C.

CONCLUSION

It was found that SDI service based on online databases is far superior to the one offered by manual methods.

The quality of output depends on proper understanding of users' requirements and translation of the same into suitable profiles. It was also found to be more economical to have a group profile for several readers having research interests common to each other.

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APPENDIX - A

KIRLOSKAR ELECTRIC COMPANY LIMITED
BANGALORE - 560 055

From : | **To Library (RAD/S)**
Ref : | **Date :**

Sub : BIBLIOGRAPHICAL SERVICES

1. Title of the Topic
2. Suggested Keywords/Classification Nos. :
3. Types of Documents required :

Books	☐	Reports	☐
Monographs	☐	Translation	☐
Articles	☐	Thesis	☐
Conference Papers	☐	Product Catalogues	☐
Patents	☐	Standards	☐
Other, if any	☐		

4. Whether abstracts are required? Yes ☐ No ☐
5. Search Period :
6. Search by any specific Author :
7. Country Coverage :

India	☐	France	☐
UK	☐	Japan	☐
USA	☐	USSR	☐
W. Germany	☐	Other, if any	☐

8. Any limitation on number of references?
9. Suggested Databases :

INSPEC	☐	DERWENT	☐
COMPENDEX	☐	WIPO	☐
NTIS	☐	Other, if any	☐

10. Do you already have any reference on the said topic?
11. Date, by which the information is required?
12. KEC Project title and expected benefits:

Signature of the Indentor: ____________________ Head of the Department __________

Name ______________________________________

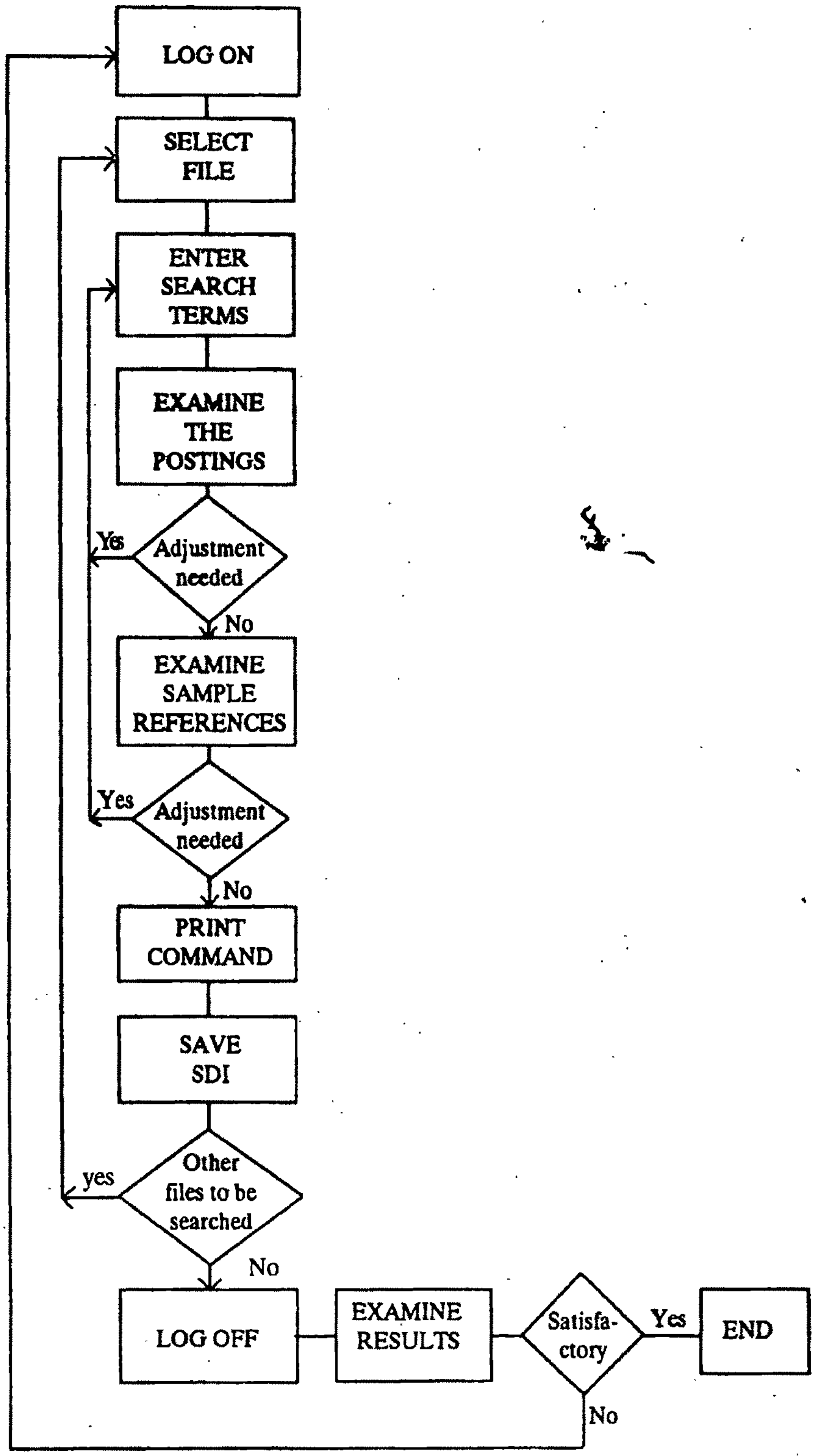
FOR USE IN THE LIBRARY

1. Work to be assigned to:
2. Date of completion of work:

LIBRARIAN

APPENDIX-B

SEARCH OPERATION FLOW CHART



APPENDIX - C

Cost Detail of SDI Service for One Year

Particulars	Computer Time Used	Cost/ Min	Computer Time Cost	Telex Time	Telex Cost/ Min	Telex Time Cost	Print Cost	Total Print	Total (in Rs)
Profile Construction (25-7-85)	72.57min	$1.92	(Rs.1797.35)	77.57	Rs.28/-	Rs.2171.96	-	-	3969.31
Profile Reservation (24-8-85)	45 min.	1.92	(Rs.1114.56)	47 min.	Rs.28/-	Rs. 1316.00	-	-	2430.56
Initial 32 SDI Notification (25-7-85 to 14-2-86)	-	-	-	-	-	-	$6.25	$200.00	
Subsequent 9 SDI output (7-3-86 to 2-7-86	-	-	-	-	-	-	$6.25	$118.75	
Grand Total									Rs. 10,530.52

SDI cost per one Topic = 10630/7 = Rs. 1518/- for one year

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BOOK REVIEW

Handbook of Libraries, Archives & Information Centres in India. Vol 7. Science and Technology Information Systems and Centres edited by B.M. Gupta and S.S. Nathan. New Delhi, Aditya Prakashan, 1990, pp 289, Rs. 325; Vol 8. Social Sciences Information Systems and Centres, edited by B.M. Gupta and V.K. Jain. New Delhi; Aditya Prakashan, 1990, pp 276, Rs. 325. (Reviewed by V.K. Rangra).

Indian publishing in library and information science has been prominent mainly in textbooks for university courses, conference proceedings, festschrift volumes in honour of the renowned retiring professionals, bibliographies and of course the journals. Very few books on contemporary topics which could be called original in approach, presentation and style have been added to the plethora of Indian professional literature. One such book which really catches attention is Handbook of Libraries, Archives and Information Centres in India, edited by B.M. Gupta and others. This publication, to appear in thirteen volumes by end of 1991, out of which nine have so far been issued, endeavours to capture the panorama of growth and development of information science and technology in the country.

The two volumes under review deal with information systems and centres which collect, process and repackage information on demand and also in anticipation in narrow subject fields and serve a special clientele engaged in some serious problems, as distinguished from the libraries which more or less act as document supply centres. The information centres have gained importance due to the fact that scientific, technological and societal information plays a key role in the progress of a nation.

Volume seven covers thirty six information systems and centres on different areas of science and technology. Besides, the seven National Information Centres of NISSAT and well known centres like INSDOC, DESIDOC, BARC, NICNET, there are write-ups on other information systems related to natural resources, water and power energy, marine fisheries, meterology, standards, patents etc.

Volume eight covers 32 papers on information systems and centres on social sciences related as manpower, trade, mass communication, education, women's studies, developmental studies, small industries, consumer research, mentally retarded, family welfare, rural development, management, public administration, defence studies, historical studies etc.

Volumes under review give fairly balanced coverage and bring at one place all those institutions some of which a working librarian or information specialist is likely to miss in normal course. The knowledge about these centres would certainly help professionals in resource sharing which is need of the day, necessitated by the rising cost of publications vis-a-vis the shrinking budget. Most of the papers are exhaustive and give useful information. However, details on annual budget, manpower name of the head, address, status of computerisation and use of other information technologies is not available in all the papers which are necessary to form an idea about the size of the institution and its services.

There is need for a separate volume on Education and Training to cover DRTC, INSDOC, Universities and institutions conducting short term courses. To check such scatter of information which is unavoidable in a multivolume publication of such a magnitude, a cumulative index may be necessary which would further enhance its value. Since the information is changing very fast, it is high time that the whole Handbook is converted into a computerised data base so that it could be easily updated and also made available to the users on a network.

These are some of the suggestions for improvement and in no way reduce the importance of the publication. These two volumes as a part of the set are invaluable and indispensable for a modern library and information centre and should be a proud possession of every enlightened and forward looking information professional.

BOOK REVIEW

Guha B: A synopsis of the report on feasibility study on automation and networking of Delhi libraries (DELNET) prepared by CMC Ltd. New Delhi, NISSAT/DSR, 1991. (Reviewed by J K Ahluwalia)

The importance of information as a vital resource in today's society is well recognized. Along with machinery and finance, it is regarded as a major input for the growth and development of any industrial and technological venture. In the present day world, the magnitude of the problem of collection, organisation and dissemination of information has multiplied manifold with the increasing number of information generators and users. The role of librarians in this set up, thus, assures added significence. The growth of information, invariably, is a contributory factor for the delay in providing the required service to the end users. The cost of providing service is also rising, mainly because of the use of manual methods and duplication of investment in library holdings. All this has made it imperative to share library resources and adopt methods offered by modern technology for the provision of more effective information services. The need for resource sharing has been well recognized but the technology options available till now were limited. CMC Ltd. Delhi look up a study and prepared a report on the feasibility of automation and networking of a number of libraries in Delhi under a contract from the National Information System for Science and Technology and the Department of Science and Technology. The report covered the analyses of the library resources, i.e. the holdings of the libraries, information exchanged between them, manpower profile, user services rendered and availability and applicability of funds. Attention is also drawn to some of the draw backs existing in the present system.

The report proposed a system of networking the libraries in Delhi with the objectives of improved utilization of funds by creating commonly usable databases and automating the functions of individual libraries. For the software requirements for library functions and user services, a structured system analysis methodology has been followed to understand the flow of specific data between various entities and data stores.

Though at one stage, it was proposed to network IIC, DST, JNU and DESIDOC libraries which have already developed local catalogue databases, through dial up modems, but a better intermediate networking proposal has been arrived at in phase I. This is a basic dial up network with appropriate system access software having the facilities of file transfer and mail utilities for the exchange of information among the systems. A packet switching network has been proposed for Phase II to support online communications requirements. The library systems are proposed to be connected to the packet switch with respective X.25 network interface units. Phase III is proposed to connect all the libraries in Delhi willing to be a part of DELNET.

Hardware configurations of computer and communications have been arrived at after considering the application areas, data volumes, future growth and networking needs. The critical parameters for all the proposed machines are worked out in line with a phased strategy of implementation. The cost of software and hardware have been given in detail.

A three-phase approach is recommended for achieving the benefits, i.e. a). improvement in quality of databases; b). increase in the usage of library holdings and turn around time for requests; c). reduction in investment due to resource sharing and d). improved utilization of library managements' time.

The synopsis of the report running into 51 pages has been brought out by the eminent information specialist Prof. B Guha. The synopsis gives the gist of the report in a highly lucid presentation with the help of data flow diagrams of various functions in the libraries and the figures representing the network configurations to be followed in Phase I and Phase II respectively. It has its own important role in promoting the objective of the study.

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